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THE MODERN FORMULARY

A TEXT BOOK OF CHEMISTRY AS APPLIED TO THE MANUFACTURE OF PROPRIETARY SPECIALTIES

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BY
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PREFACE.

In these days of formula books almost without number, it seems much like "carrying coals to Newcastle" to place another one before the public, however, I trust this volume will serve some useful purpose in aiding the ambitious manufacturer in placing on the market a line of specialties which will be characterized by the triad of things desirable in this class of products—genuine merit, attractiveness and salability.

If the amount of labor and research required in the production of a book is any criterion of its value, then this work must be, indeed, a valuable one. The work of compiling and preparing the matter contained herein has extended over a number of years and represents an amount of study and experiment which can hardly be appreciated by anyone who has never attempted the preparation of a work of this kind. Aside from the actual preparation of the manuscript for the printer, hundreds of formulas have been tested out and accepted or rejected, according to the results of these tests; many hours have been occupied in studying and comparing the writings of authorities on the different subjects treated, with a view to determining the latest and most approved opinions on the points involved; experiments almost without number have been made to discover the best methods of handling the formulas given and so much other work done along different lines connected with the preparation of this volume that a recital of it would only serve to weary the reader.

This book is not offered as a literary masterpiece. It has been prepared during such time as could be had amid the handling of the multitudinous details of a constantly increasing business, a single chapter in some instances representing the work of many months. No attempt has been made at arranging the subjects treated in alphabetical order but I have attempted to remedy this defect by providing a very comprehensive index, rendering the location of any particular bit of information comparatively easy. This work has been prepared for practical people and for every day use in the laboratory and I trust that the nature of the information given will merit the overlooking of any faults of construction.

I have not adhered strictly to the most approved usages, in the nomenclature of the materials called for by the different formulas given. While I suppose this alone would be sufficient to condemn this work in the eyes of those ultra-correct scientists who, in their strenuous fight for absolute correctness in minutiae sometimes overlook the practical side of matters, but it will matter little to the practical mixer whether the material he uses is bought under the name of sulphate of iron or ferrous sulphate.

To the experienced pharmacist, no doubt, many of the explanations and directions given will appear superfluous, but it should be kept in mind that not all who will make use of this work have had the advantages of a chemical and pharmaceutical education, and it has been written from the standpoint of the man whose opportunities in the way of acquiring this class of knowledge has been limited. Every effort has been made to make the entire work of a nature to be easily understood by the merest neophyte in the art of proprietary manufacture.

When utilizing material from outside sources, in the preparation of this work, I have, wherever possible, given

full credit for same. In numerous instances, however, it has been impossible to trace formulas and similar matter to their source and whenever credit is not given for reprinted matter, it is due to this reason rather than to any desire to claim as original matter something which has been the product of other brains than my own.

I take this opportunity of expressing my obligation to those friends who have so generously aided me in obtaining information concerning the various subjects treated in this work as well as to the publishers of The Druggist's Circular, National Druggist, Pharmaceutical Era, The Western Druggist, Bulletin of Pharmacy, Practical Druggist, and the American Perfumer and Essential Oil Review, for their kind permission to make use of articles appearing in these journals. Much of any value this work may possess depends upon the use of matter from these sources.

To the American Perfumer and Essential Oil Review, I am especially indebted for a considerable portion of the descriptive matter relative to flavoring extracts and perfumes. To the National Druggist should be accredited several of the formulas for perfumes making use of concrete flower odors.

In every case where material has been drawn from these sources, it is for the reason that it represents the most authoritative information on the particular subject to which it refers. Every formula given has been personally tested and proved reliable before being admitted to a place in these pages.

It has not been possible to cover all lines of proprietary manufacture in this volume, without being too brief in the discussion of each. Those subjects which are covered are given very thorough treatment and the formulas with very few exceptions, represent the latest ideas in the class of specialties they represent. In a few instances, out of date

or impracticable formulas have been given for purposes of comparison but in every case where this occurs, attention is called to the fact that these formulas are not recommended for use.

That this work will prove a stepping-stone in the establishment of many a profitable and permanent manufacturing business, is the sincere wish of

THE AUTHOR.

Syracuse, N. Y., January 28th, 1909.

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THE MODERN FORMULARY

INTRODUCTION.

Although the science of Chemistry, in the modern acceptance of the term, can only be said to have existed from the latter part of the seventeenth century, evidence is not wanting that many of the ancient peoples, the Egyptians, Babylonians and others possessed knowledge of many chemical processes, including the manufacture of glass, the tanning of hides and the extraction of the more common metals from their ores. This knowledge, such as it was, can hardly be termed a science, as most of these discoveries were the result of accident and the work was done by "rule of thumb" instead of being conducted on scientific principles, and such knowledge as existed on the subject was transmitted from father to son without any material improvement.

During the Middle Ages, the intellect of humanity was obscured by the gross ignorance which then prevailed and there were but few avenues in life open to the man of genius and ability. Painting and Sculpture were regarded as the master callings and fame and renown were only to be won by the chisel or the brush. Chemistry was given over to charlatans and known as Alchemy, while the science of Medicine was held in contempt. The teachings of previous ages were forgotten and the undiscovered treasures of Science lay untouched in their hiding places, while the race plodded on in the worn track of centuries groping slowly and painfully toward the light of reason and knowledge.

The work of the Alchemists during this as well as at later periods was chiefly directed toward the discovery of the "Philosopher's Stone" and the "Elixir of Life," and, while they were doomed to disappointment in their efforts, their attempts to transmute the baser metals into gold, irrational as they were, lent a new impetus to the study of Chemistry and resulted in the discovery of many chemical elements and compounds previously unknown. Their records have come down to us as a curious mixture of scientific statements and an almost unintelligible jargon of words relating to magic and esoteric relations between the various metals and the celestial bodies, the sun, moon and planets. Nevertheless, Alchemy must be considered an important link in the chain of development of chemical knowledge.

By far the larger proportion of the students of the Alchemistic art were thoroughly earnest in their endeavors, but there is no disputing the fact that among them were many rank pretenders. The story is told of a certain alchemist who claimed to have discovered the long-sought secret of transmuting lead into gold and accordingly arranged to give a demonstration of his powers before the reigning monarch of the country. At the appointed time the king and nobles assembled to witness the wonderful feat, and the "wizard," with many awe-inspiring incantations, proceeded with his experiment. The lead was duly melted and as the assembled spectators gazed in open-mouthed and almost breathless interest at the seething mass in the cauldron before them, wonder of wonders, they observed the lead turning into gold before their very eyes. Seeing was believing and they could not doubt the evidence of their own senses, so with one accord they began to congratulate the worker of this magic. But unfortunately for the "wizard," some of the assembly took it into their heads to examine the magic

wand with which the feat had been accomplished and the secret was a secret no longer. The "wand" was formed from a rod which was hollow for part of its length and had contained a quantity of pure gold in fine powder with a plug of lead to hold it in place. When the proper temperature was reached the lead melted, the gold mixed with the melted metal in the cauldron and the seeming miracle was accomplished.

About the close of the 17th century Chemistry began to be systematically studied and developed, and theoretical and practical Chemistry thereafter went hand in hand until both attained their present high state of perfection. With the discovery of oxygen by Scheele and Priestly in 1774 and the promulgation of the "Atomic Theory" by Dr. John Dalton of Manchester in 1808, the science of Modern Chemistry may be said to have been born.

Naturally, with the growth of this science, the sister sciences of Medicine and Pharmacy made a corresponding development. The empirical ideas of previous ages were gradually abandoned and the relation of one chemical to another and their action upon the human system came to be understood to depend upon certain well defined natural laws instead of being due to magical or supernatural influences and the practice of Medicine and Pharmacy slowly rose from the despised and uncanny art of the wizard and sorcerer to the dignity of a profession.

The history of Chemistry during the past century forms one unbroken record of development and progress. Modern Chemistry reached its greatest triumph in the discovery of methods for the artificial production of many organic bodies, and to-day a large number of alkaloids and similar substances are produced synthetically. Beginning in 1828, when Woehler succeeded in effecting

the synthesis of urea from wholly inorganic materials, this branch of the science has claimed the attention of some of the brightest minds in the scientific world and their discoveries have revolutionized many phases of chemical industry. While much has already been accomplished along this line, there is still a wide field for further progress and all indications point to discoveries and achievements in the future which will cause those of the past to pale almost into insignificance.

SECTION I

ELEMENTARY CHEMISTRY.

It is no part of my purpose, in preparing this work to deal with the phenomena of chemical action, as such, but rather to consider such phenomena from the standpoint of their relation to the application of Chemistry to the Art of Compounding. However, the knowledge of certain fundamental facts and principles is essential to the clear understanding of the different formulas which will be considered in subsequent chapters, hence, I shall touch briefly upon some of these underlying principles of Chemical Science.

Chemistry has been defined as "That branch of Science which treats of the composition of substances, their changes in composition and the laws governing such changes." In order to clearly comprehend any of the phenomena of chemical action, we must distinguish clearly between the physical and chemical properties and changes of matter.

A bar of iron is the same composition whether it be hot or cold. It may be converted into a magnet and afterward deprived of its magnetic power without ceasing to be metallic iron. It may be rolled into sheets or drawn into wire without affecting in any way its composition and from either of these forms may again be transformed into its former shape and condition. These changes of form, temperature, etc., therefore, are purely physical, and we may define a physical change as one which does not affect the essential character of the substance changed.

But if the bar of iron is submitted to the action of a powerful acid an entirely new substance, in no way resembling metallic iron, is produced. During this process the iron has undergone a change in its innermost structure and it is to changes of this kind that the name "chemical changes" has been applied.

In order to get a clear understanding of this, let us briefly consider the Constitution of Matter.

In nature we recognize an almost limitless number of different substances and in addition to these natural substances we also find a host of artificial bodies, so many of which are theoretically possible that we cannot even conceive of their number. By analysis which is simply the separation of a compound body into its component parts, and synthesis, which is the reverse of this, or the combining of various elements so as to produce a substance under consideration, it has been proven that nature works with a comparitively small number of materials, producing her varied effects by blending them in an almost infinite variety of combinations, and that the same component parts are continually repeated in various modes of union. In separating these bodies into their component parts, it has also been found that in time we arrive at bodies or substances so simple that they cannot be further separated. These simple substances, of which some eighty are now known, are termed elements.

Of these eighty elements, more or less, about twenty are common and are constantly recurring, while the remainder are less common, many of them being so rare as to be mere chemical curiosities.

It is a well known fact that when we subject a piece of iron to a high degree of heat, it expands or becomes larger, and that when it is cooled it again regains its former size. In both these conditions the weight remains exactly the same, the change being one of volume or bulk only. This

and many other similar effects have led to the hypothesis that all matter, as we ordinarily recognize it, is made up of minute separate particles, which may be driven farther apart or crowded closer together by various means. To these particles the name Molecules has been applied. It must be understood that these molecules are exceedingly minute, invisible even by means of the strongest microscopes and absolutely indivisible by mechanical means. From certain physical data it has been possible to learn approximately the size of the molecules of various substances and some idea of their minuteness may be obtained from the statement that five hundred millions of hydrogen molecules placed side by side would only measure one inch in length.

But minute as they are, these molecules are capable of being divided into smaller particles still, but it is only by means of chemical action that this division of the molecules can be effected.

For example, water, one of the most common of substances, is composed of two elements, oxygen and hydrogen. Every molecule of water contains two atoms of hydrogen and one of oxygen firmly united through the force we term chemical affinity. We may divide again and again a drop of water until it becomes so small as to no longer be visible to the eye, but still the substance is water. But if we pass a current of electricity through water under proper conditions, it is immediately separated into two gases. This electrolysis, as it is called, results in the breaking up of the molecules themselves when the atoms of oxygen and the atoms of hydrogen unite with other atoms of the same kind, as it is impossible for any atom to exist singly. Thus, even in the gases which are formed, we have a molecular structure similar to that which was present in the liquid, except that in the former the molecules are all one kind of atoms, while in the latter they were a combination of the two kinds of atoms in chemical union.

Under the same conditions, the atoms of the various substances always unite in the same proportions. For example, no matter what proportions of oxygen and hydrogen may be present in a closed vessel when an electric spark is passed through it, the resulting product will be composed of exactly twice as many atoms of hydrogen as oxygen, in other words will be water, and any excess of either gas beyond what will unite in exactly these proportions will remain unchanged in the vessel. By a roundabout process it is possible to unite any number of hydrogen atoms with an equal number of oxygen atoms, forming Hydrogen Peroxide, but this never occurs by the direct union of the oxygen and hydrogen atoms.

A given element may not unite with the same facility with all other elements. Certain ones exhibit a strong tendency to unite with certain others, while with others they may unite only with difficulty or not at all. In some instances the union of the different elements is very strong, requiring an exceedingly powerful force to separate them; in others they are very loosely united and the compound breaks up at the slightest provocation. This is especially true of many of the compounds of Nitrogen and accounts for the explosibility of these compounds. Being so loosely united they break up into their component gases readily, and in changing from the liquid or solid to a gaseous state they increase greatly in volume, thus producing an immense pressure upon the surfaces which confine them.

When a molecule consisting of two or more atoms comes in contact with any other element for which one or more of the atoms in the molecule has a greater affinity than for those with which it is already combined, they will immediately leave the combination with which they are united and go to make up a new combination. For example, if we mix Hydrochloric Acid and Zinc filings together, the chlorine of the acid has a greater affinity for the zinc than for the

hydrogen and unites with the zinc, forming zinc chloride, while the hydrogen gas will escape into the air causing the effervescence or bubbling which is seen when these two substances come in contact.

Having thus far studied the nature of the atom and the molecule, we may now form new definitions for Physical and Chemical Changes, as follows:

A Physical Change is any change in the mass which does *not* affect the composition of the molecule.

A Chemical Change is any change which does affect the composition of the molecule.

It is customary to represent the various elementary substances by symbols, which are for the greater number, abbreviations of the scientific name of the substance. For example, H represents Hydrogen; O, Oxygen; C, Carbon; Cl, Chlorine; S, Sulphur; Fe. (from the Latin Ferrum) Iron; Na (Latin-Natrum), Sodium, and so on. By grouping these together we may represent molecules and a chemical symbol is always understood to represent the composition of any single molecule of the substance. Thus, HCl. represents one molecule of Hydrochloric Acid. When we wish to specify two or more molecules, we prefix a figure (called a co-efficient) to the symbol, as 2 HCl. represents two molecules of Hydrochloric Acid. In cases where more than one atom of the same kind enters into the composition of a molecule, a small figure is added to the sign of that element, representing the number of atoms of that particular element the molecule contains. Thus, H_2 SO_4 represents one molecule of Sulphuric Acid which is composed of two atoms of Hydrogen, one of Sulphur and four of Oxygen.

Sometimes a group of atoms act together in the same way as a single atom. This is true of such substances as Ammonia (NH_4) where the group (NH_4) remains together uniting with the other atoms as if it were a single atom

itself. To such groups, as well as to single atoms, the name Radical has been applied.

Radicals are of two kinds, Basic and Acid. A Basic Radical is a metal or anything behaving like a metal. The latter part of this definition is rendered necessary by the fact that certain non-metallic substances act in chemical combinations exactly as metals. Here also ammonia may be considered as an example.

An Acid Radical is a non-metal or any Radical behaving like a non-metal.

An acid is a substance containing Hydrogen that may be replaced with a basic radical. This definition is easy to understand from the illustration given in a former paragraph, of the action which occurs when Hydrochloric Acid comes in contact with Zinc.

A salt is the substance formed when the Hydrogen of an acid is replaced by a basic radical. Thus, Zinc Chloride formed in the experiment already referred to is a salt.

The salt always takes its name from the basic radical, which has replaced the hydrogen of the acid. If the salt consists of only two elements the class name always ends in *ide,* as chloride, oxide, sulphide, etc. Where salt contains three or more different kinds of atoms, the name will end in *ate*, or *ite,* the former denoting a salt formed from an acid ending in *ic* and the latter from one ending in *ous*. The terminations *ic* and *ous* as applied to acids, indicate respectively a greater and lesser degree of chemical activity.

An alkali is a base soluble in water. Alkalies possess the power of neutralizing acids and vice versa. Most basic substances are strongly alkaline. Examples, Soda and Potash.

The difference between physical combinations and chemical combinations should be clearly understood. Physical combinations are those in which the various ingredients are merely combined mechanically without losing in any way

their own identity. A mixture of alcohol and water is a good example of this kind of combination and from such a mixture the alcohol can readily be separated by distillation. Chemical combinations are those in which some form of chemical action has occurred between the different ingredients used, causing them to lose their identity as individual substances and to be entirely changed in nature. Such a combination would be illustrated by a mixture of ordinary vinegar with baking soda, which would result in the destruction of both ingredients and the formation of an entirely different substance by a new union of the atoms in different combinations. Physical combinations are commonly referred to as *mixtures,* while chemical combinations are known as *compounds,* but this rule is not absolute and many writers use the two terms interchangeably.

Sometimes two substances which will not form a physical combination may be caused to unite by the addition of a third substance, which enters into chemical combination with one of them, changing it into a substance which is miscible with the other. As an illustration of this, put equal parts of olive oil and water into a bottle together. No amount of shaking or heating will cause them to form a permanent mixture. Now add a little ammonia. The olive oil is converted into soap, which being miscible with the water will readily combine with it on shaking.

In mixing the various ingredients of any preparation being compounded it must be kept in mind that physical conditions have a great effect upon the chemical union of the substances used. For example, any proportions of oxygen and hydrogen gases may be stored in the same vessel for any length of time without any possibility of their uniting to form water. In order to effect such a combination some physical force must be exerted to produce the desired effect. The passage of an electric spark through the mixture produces a degree of heat sufficient to force the atoms

of the oxygen and hydrogen molecules far enough apart (i. e., to expand them) that the chemical affinity of the oxygen atoms for the hydrogen atoms, which is stronger than that existing between either kind of atoms for others of their own kind,is brought into action, when they unite in obedience to the stronger affinity. If the proportions of oxygen and hydrogen are exactly one part of the former to two of the latter the entire contents of the vessel will be converted into water. Should there be a preponderance of either gas over these proportions as, for example, one part of oxygen to three of hydrogen, it will be readily seen that each oxygen atom will join itself to two hydrogen atoms, and when this process has been carried far enough that all the oxygen atoms have entered into such combination, there will still remain in the vessel, in addition to the water formed, one part of free hydrogen gas which having nothing to unite with will remain unaltered.

In the same manner, iron filings and sulphur may be rubbed together in a mortar, without combining in any way except mechanically. The iron will still remain iron and the sulphur, sulphur, but apply the proper degree of heat to the mixture and the two substances immediately unite to form Iron Sulphide, which is entirely different in nature from either of the substances used in producing it.

Although there are other physical forces which tend to aid chemical combination, heat is the one most frequently utilized for the purpose. In addition to its use for this purpose, it often facilitates the mixture of various substances which by reason of their physical properties are incapable of mixing at ordinary temperatures, as waxes, etc.

When two substances are of such a nature that they will not combine into a homogenous mixture they are said to be incompatible, as oil and water. The same term is applied to salts and other substances which cannot exist together in solution without natural decomposition. Some

knowledge of the relations of the various ingredients used in proprietary manufacturing, to each other, with regard to this point is essential to the mixer who expects to avoid needless experiment and danger from the possible formation of noxious or explosive compounds in the preparation he is producing.

The subject is of special importance to the pharmacist or anyone else who mixes medicines. It is possible that the mixing together of two substances, either of which taken alone would be entirely harmless, may result in the formation by chemical action of a third substance which is of the most dangerous nature. For example, a mixture of calomel with a solution of ammonium chloride, commonly called sal-ammoniac, would be very likely to result in the formation of the extremely poisonous mercuric bi-chloride or corrosive sublimate and a mixture of permanganate of potash with glycerine would produce a dangerously explosive compound.

The mixer's safeguard against results of this nature lies either in informing himself along these lines sufficiently to permit of his understanding the various reactions which will result from combining the ingredients he is using, or else using only formulas from known reliable sources and sticking closely to the mixing directions accompanying same.

In mixing various ingredients together, it will sometimes be noticed that a precipitate is formed, as in the case of mixing a solution of alum with a solution of ordinary baking soda. This is due to the formation, by the chemical reactions of the ingredients, of a substance which is insoluble in the liquid used in making solutions. In other instances a decided change of color will be observed when two solutions are mixed together, as when mixing solutions of sulphate of iron, commonly known as copperas, with ferrocyanide or yellow prussiate of potassium. In this instance the change of color is due to the formation of Prussian blue

which imparts an intense blue color to the solution but finally precipitates or settles to the bottom of the container. With other substances the color change may occur without the formation of a precipitate.

In Chemical Analysis, the results mentioned above, i. e. precipitation and changes of color, serve to indicate the identity of the substance under examination, most of the laws of Qualitative Analysis being based upon such phenomena.

Despite the fact that people generally look upon the work of the chemist with something akin to awe, as they are wont to do upon things which are entirely beyond their comprehension, there is no magic art about chemical analysis. Qualitative Analysis simply consists of applying certain tests to the substance under examination with a view to ascertaining the ingredients of which it is composed. As stated above, advantage is taken of the fact that by means of certain other substances which are known as reagents, various effects may be produced in the substance being examined, each of which is characteristic of the presence or absence of some particular substance or group of substances.

Quantitative Analysis takes up the work where Qualitative Analysis leaves it and the work in this branch of the subject consists in going carefully over the work to determine the quantity of each ingredient which we have proved to be present. Sometimes this is done by isolating the ingredient and weighing it directly, but in a great majority of instances, some definite compound of the base under consideration is produced by the use of a suitable reagent and the operation of weighing is performed upon this compound. Then by a comparitively simple mathematical calculation the operator is enabled to tell exactly the quantity of the basic substance present. This calculation involves the use of the atomic and molecular weights of the various bases and is altogether too complex to be explained within the

limits of a work of the nature of this one. Any good high school text book on Elementary Chemistry will explain these matters in full.

Still another method of determining quantities of ingredients known to be present in a mixture or compound is known as Volumetric Analysis. Under this head would come such operations as finding the amount of a particular acid present by observing what quantity of a standard alkaline solution is required to exactly neutralize it, or the amount of iodine present in a solution by noting the amount of a solution of sodium hyposulphite of known strength required to entirely de-color it.

To make this clearer, we will suppose that the presence of iodine in a solution under examination has been proven. The chemist knows or can ascertain by consulting his authorities just how much sodium hyposulphite is required to de-color one grain of any given quantity of iodine in solution. He, therefore, prepares a solution of this salt making it just the proper strength that, say one-half dram of the solution will contain enough of the "hypo" to de-color exactly one grain of iodine solution. This solution he adds to the iodine solution drop by drop, with constant stirring until the color entirely disappears, when by subtracting the quantity of the solution he has left from the quantity he prepared he can readily find just how much he has used. Suppose that he finds that he has used five drams of the test solution, then he would immediately know there were ten grains of iodine in the solution being tested.

This is a very crude explanation of the matter, and in actual practice the calculations would be made by the metric system and a graduated tube provided with a stopcock at the bottom, known as a burrette, would be used in adding the test solution to the mixture being tested, thus enabling the operator to determine exactly the quantity of the reagent used by taking the readings of the height of the liquid on

the graduated scale when beginning and at the close of the operation.

Although only the merest glimpse of the field of chemical knowledge is given in this section, it is sufficient to enable the reader to comprehend the explanations of the various processes described later on. It would be impossible to give anything like a complete treatment of the subject within the limits of a volume of this kind, therefore, I have confined myself to those points which would seem to be of the greatest importance in view of what follows. The full relation of this section to the remainder of the work will become apparent as we proceed and frequent references will be made to the facts set forth here to avoid the necessity of repeating the statements in subsequent pages of this volume.

To those who desire to go more deeply into the subject, I would recommend the purchase of some text book on Elementary Chemistry as "Elementary Chemistry" by Clarke and Dennis, published by the American Book Co., of New York City, and selling at $1.25.

SECTION II

LABORATORY EQUIPMENT.

The proper equipment of a laboratory for the manufacture of proprietary preparations will, of course, vary with the nature of the line to be produced. Many specialties, both household, toilet and medical may be prepared with no further apparatus than would be found in any well equipped kitchen, with the exception of a pair of scales and a glass graduate. In case the materials are purchased in the exact quantities called for in the formulas used, even these might be dispensed with, but it would be practical to do this only where the work is carried on in a very small way.

Some products, as soaps, require special apparatus for their production, but aside from these almost any kind of product may be compounded with no further equipment than the necessary instruments for weighing and measuring the ingredients entering into the preparation, suitable vessels for mixing the ingredients together and facilities for filtering should the product be of such a nature as to require this.

The better equipped the manufacturer is for his work, the better specialties he can produce and facilities for handling the work expediously will enable him to lower the cost of production.. My advice to the beginner would be to purchase such apparatus as is really necessary and to add to his equipment from time to time as the increase of business would seem to justify and his necessities to require.

A general description of the more common forms of apparatus, with suggestions as to the use and care of same, follows:

SCALES.

A good accurate scale is an absolute necessity to every mixer. It is a good plan to have two scales, one of which is adapted for fine work and the other for weighing large quantities. For the former, the Fairbanks Prescription Scale, costing about four dollars, and weighing from 1/8 grain to 1 ounce is excellent. This is made with a beam and sliding weight, so that no loose weights are required. For the other scale an ordinary balance scale of the kind used by grocers is entirely satisfactory.

These may be had from two dollars upward, according to style and finish. With this scale you will need a set of weights running from one ounce up to five or ten pounds, or even higher, according to the amount of materials you are handling.

Both scales and weights should always be kept in a clean dry place and no dust, dirt or foreign matter of any kind should be allowed to accumulate on them. Such things not only injure the appearance of the apparatus, but by causing rusting soon destroy the sensitiveness and accuracy of the scale.

In case you are weighing corrosive substances of any kind, it is advisable to have glass plates of known weight which can be placed over the pans of the scale during the process. The use of these in weighing greasy substances will also save much labor in the way of cleaning up the apparatus.

GRADUATES.

As in nearly all formulas, the liquids are specified by measure instead of weight, one or more glass graduates will be required by everyone engaged in the manufacture of

proprietary preparations of any kind. The most convenient sizes are the four and eight ounce conical graduates and what is known as a minim graduate, which measures quantities up to one or two fluid drams in minims.

For quantities of liquids of one pint or over the ordinary tin measures will generally be found accurate enough for all purposes. However, it must be kept in mind that such measures are not adapted to measuring strong acids, etc., which would exert a corrosive action on the tin. They are adapted for measuring syrups, alcohol, water, fluid extracts, etc., etc.

MORTARS.

These are indispensible in many forms of manufacture. Just how complete an equipment of these will be needed depends largely upon the nature of the article being manufactured. For powdering hard substances a brass, iron or bell metal mortar of fair size is used. These mortars are generally made with flat bottoms instead of rounded as are those intended for trituration, and the pestle is made of the proper shape to adjust itself to the shape of the inside of the mortar. A cover made of tin, sheet iron or wood, with an opening in the center large enough to permit the free action of the pestle, should be provided with such mortars. The purpose of this is to prevent the particles from flying while pounding them.

At the present time, drug mills are largely employed for many purposes for which mortars were formerly used, such as powdering dried herbs, roots, barks, etc. However, for crushing many substances as rosin, etc., a mortar is preferable. The ordinary spice mill or coffee mill used by grocers is well adapted to the needs of the manufacturer of proprietary specialties. At the present time, most of the materials used may be purchased in powdered form at a slight advance in cost, so that a drug mill is not really necessary

except where the work is done on so large a scale that the powdering of your own materials would mean a considerable saving.

In addition to the large mortar mentioned above, one or two smaller ones should be provided. A wedgewood or porcelain mortar holding up to ½ gallon will be needed for making emulsions, while a small (4 to 8 oz.) glass mortar will be most convenient for powdering small quantities of any substance or in making up experimental lots of salves, ointments, etc.

SPATULAS.

These are thin bladed knives which may be obtained from any dealer in chemical or pharmaceutical apparatus. They are used for many purposes, such as mixing powders, making salves and ointments, spreading plasters, etc. Being cheap, every laboratory should be provided with one or more of them.

PERCOLATOR.

The percolator or as it is sometimes called displacement apparatus, is a very convenient article to have in the laboratory. This, in its simplest form consists of a cylindrical or conical tin tube, with a smaller funnel shaped bottom terminating in a tube, and provided with several perforated diaphraghms of varying sizes of openings, which fit loosely into the tube. Some of these are provided with a stop cock at the bottom while others work by removing a cork. They are used for making extracts, directly from the roots, herbs, etc., as well as in the manufacture of fluid extracts of all kinds. Whether you will require one of these or not will, of course, depend upon the nature of the goods you are produsing.

In preparing extracts by percolation, the drugs are ground to a moderately fine powder, varying with the nature of the herb, root or bark, as the case may be. This is

mixed with a portion of the liquid to be used for percolating (known as the menstrum) and allowed to stand in a covered vessel in a moderately warm place for from six hours to as many weeks. This part of the process is termed maceration. It is then transferred to the percolator, packed firmly and evenly and the remainder of the menstrum added.

When the liquid has ceased to flow, measure the percolate and then pour just sufficient water over the drugs to make the measure of finished product exactly the amount of menstrum used. This water will displace the menstrum from the drugs forcing it before it, and if care is used to collect no more percolate than you have used menstrum, you will find that you have only the menstrum combined with the active principles of the drugs, the water all remaining in the drugs themselves.

THERMOMETERS.

The ordinary thermometer consists of a slender glass tube, with a small bore, containing in general, mercury or alcohol, and provided with a graduated scale. The liquid contained in the instrument expands and contracts by variations in temperature of the atmosphere or on being brought into contact with any other body or being immersed in a liquid or gas which is to be examined.

The thermometer was invented by Galileo at some date prior to 1611, but has undergone various modifications since that time which, while they have not changed the principle on which it acts, have rendered it more convenient to use.

The two forms of thermometers in most general use are the Fahrenheit and centigrade. In the former, the scale is so graduated that zero is placed thirty-two degrees below the freezing point of water, which brings the boiling point of this liquid at 212 degrees. In the centigrade thermometer, used widely throughout Europe and very extensively in scientific investigations everywhere, the space between the

freezing and boiling points of water is divided into 100 equal parts or degrees, zero representing the freezing point and 100 degrees the boiling point.

Another form of thermometer known as Remaur's was formerly used largely in Germany and Russia, but is rapidly being superceded by the centigrade thermometer. In Remaur's scale, the difference between the freezing and boiling points of water is divided into 80 degrees, the zero being at freezing.

To reduce a Fahrenheit temperature to its equivalent in centigrade degrees, subtract 32° and multiply the remainder by 5-9. To reduce a centigrade temperature to its Fahrenheit equivalent, multiply by 5-9 and add 32° to the product.

Various styles of thermometers are to be had adapted to particular purposes. One of these special forms worthy of special mention is the so-called "floating thermometer," which is provided with an air chamber similar to that used in hydrometers which causes it to float upright in any liquid in which it may be placed. Registering thermometers are constructed in such a way that when the mercury has arisen to any point on the scale it will remain there indefinitely unless the instrument is exposed to a higher temperature or the mercury jarred back into its normal position. Clinical thermometers, used by physicians, are of this class.

One or more thermometers should be included in the equipment of every laboratory. By making judicious use of one of these you will save much trouble which is often caused by overheating a compound during the process of manufacture, and in addition to this you will often be able to identify a liquid, wax or resin by noting its melting point.

THE WATER BATH.

This in its simplest form consists of two vessels of different size, the smaller being placed within the larger and

the space between filled with water. It is used where it is desirable not to allow the amount of heat applied to any mixture exceed that of the boiling point of water. An ordinary glue pot or double rice boiler makes an excellent water bath, and in the absence of this, two basins prepared as directed above may be used.

It is sometimes as desirable to obtain a higher temperature than 212° Fahr., without subjecting the material being heated to the direct action of the fire. In such cases a sand or oil bath (described below) may be used, or a considerable increase in the temperature of the water bath itself be obtained by taking advantage of one of the principles of Natural Philosophy, viz., that as we increase the density of any liquid we raise its boiling point: Thus by dissolving various salts in the water used in the water bath we can get a considerable variation of temperature. The following table gives the boiling points of saturated aqueous solutions of a considerable number of common salts, according to the Fahrenheit and centigrade scales:

Sodium Acetate	256 Fahr.	125 C.
Sodium Nitrate	246 Fahr.	119 C.
Potassium Nitrate	238 Fahr.	115 C.
Ammonium Chloride	236 Fahr.	114 C.
Magnesium Sulphate	222 Fahr.	107 C.
Alum	220 Fahr.	106 C.
Potassium Chlorate	218 Fahr.	105 C.
Copper Sulphate	216 Fahr.	103 C.
Iron Sulphate	216 Fahr.	102 C.
Copper Sulphate	216 Fahr.	102 C.
Lead Acetate	215 Fahr.	101 C.

By selecting the salt that gives the temperature nearest that you wish, its saturated solution may be used instead of clear water and for many purposes such solutions will be found very convenient.

THE OIL BATH.

This is exactly the same in form as the water bath, differing from it only in that various oils are used instead of water in the outer chamber of the apparatus. Its use in connection with the water bath gives us a wider range of temperature than is obtainable with the water bath alone.

THE SAND BATH.

This is similar in application to the water and oil baths, but its use enables us to get a higher degree of temperature than is possible with either of these. The simplest form of sand bath consists of a comparitively shallow basin, partially filled with fine sand on which the vessel containing the substance to be heated is placed. It should be remembered that a thin layer of sand is quite as effective as a much thicker layer and a large quantity of sand only delays the operation without affording us any advantages over the smaller quantity.

The sand bath is useful where any liquid is to be heated in a glass vessel, as by diffusing the heat it prevents breaking the glass from unequal heating. The same effect may be obtained by interposing a sheet of asbestos or a fine wire screen between the flame and the glass.

STIRRING RODS.

These are pieces of glass rod or tubing used for stirring preparations in the process of manufacture. They can be easily made by anyone by marking the rod or tube on one side with a file, then placing it with the marked side away from the operator and pressing opposite the scratch with the thumbs, pulling toward you at the same time with the fingers of both hands. It will break off squarely. The ends are then rounded by holding in a gas or alcohol flame, or in the case of tubes being used the ends are heated until they close. If you desire to form a cap on one end of the tube to indicate the top, it is only necessary to heat the end

red hot and then press it firmly on a glass or porcelain slab. These stirring rods are very useful and as they are cheap and easy to make every mixer should be provided with one or more of them. Their advantage over all other forms of stirring rods lies in the ease with which they may be cleaned and their ability to resist acids, alkalies, etc.

HEATING APPARATUS.

It is absolutely essential that some means of obtaining heat be provided in every laboratory. Where gas is available this is a very simple matter, it only being necessary to connect the gas jet with a Bunsen burner or "hot-plate" as seems most convenient for your use. In the absence of gas an alcohol or gasoline burner may be used ,or an ordinary oil stove will be found serviceable in case no other facilities are at hand. The home manufacturer who has access to the kitchen range is particularly fortunate as this will answer every requirement without involving any expense for special heating apparatus.

SECTION III

PHARMACEUTICAL PROCESSES.

It is very essential that the mixer be familiar with certain Pharmaceutical Processes, including Solution, Percolation, Distillation and the various methods employed of separating one liquid from another with which it is immiscible.

In this chapter I shall deal briefly with these operations and hope to clear up a subject which has always been a bugbear to the amateur mixer, who, for some unknown reason, is prone to consider these processes as something beyond his power of understanding and to immediately pronounce any formula or process calling for the employment of one or more of them as impracticable.

Divested of the mystery which always attaches itself to any unfamiliar subject, these processes will be found simple in the extreme, requiring only apparatus of the simplest character and not being beyond the ability of the merest neophyte in manufacturing chemistry.

Solution is the process of combining solids or gases with liquids in which the solid or gas is liquified or made to disappear in the liquid applied as a solvent. This combination of a liquid with a solid or gas is known as a solution and when as much of the given substance has been added to the solvent as it is capable of retaining, the solution is said to be saturated. Substances which are not acted upon by solvents are said to be insoluble.

Solubility is distinctly a comparitive term, as a substance which is entirely insoluble in one solvent may be readily dissolved by another, as in the case of guttapercha, which

though entirely insoluble in water or alcohol is readily dissolved by chloroform. Again, a substance like sulphur which is considered insoluble in water, when shaken for a considerable time with this liquid imparts to it its characteristic odor and taste, proving that it is soluble to at least a very slight degree.

As used in connection with manufacturing processes, solution generally refers to the operation of dissolving solids into liquids. It may be considered under two distinct heads, as simple or physical solution and chemical solution. Simple solution is the term applied to instances where the solid undergoes no change except in form and where the solid substance may be again recovered by evaporating the solvent. Common salt mixed with water is a good example of simple solution. Chemical solution is a term which applies to those instances in which the dissolved body is changed by the chemical action of the solvent or some of the substances added so that the process of evaporation will result in the production of a body having different properties. The solution of mercury in nitric acid is an example.

Solution is generally facilitated by reducing the solid to the form of a powder and in most instances the application of heat favors solubility. Stirring or otherwise agitating the solid with the solvent also hastens the process. In some cases the application of heat is inadmissible but in such cases the mixing directions accompanying the formula generally mention this fact.

Filtration is the process of separating liquids from solids with the view of obtaining the liquids in a transparent condition. It is accomplished by passing the liquid in which the solids are suspended through porous media known as *filters,* which may be made from a variety of substances such as paper, paper pulp, sand, asbestos, charcoal, etc. The one in most common use is a special kind of paper known as filtering paper, which may be obtained from any druggist.

This paper comes in a variety of weights and sizes and is usually put up in packages of 100 sheets. It is sold in two colors, white and grey, and being cut circular, is easily folded to fit the funnels which are commonly used as filter supports. For general use, I prefer the French paper, the "Prat Dumas" brand being one of the best obtainable.

A supply of these papers in various sizes may be obtained for a trifling sum and should form a part of the equipment of every laboratory.

Several methods of folding filter papers have been suggested but only two are in common use, viz., the plain and plaited filter. In folding the former, the paper is simply folded in half, and then folded again, thus dividing it into four equal portions. It will then have the shape of a triangle with one rounded side. It is then opened out from the rounded edge so as to leave three thicknesses on one side and one on the other, and is then placed inside a funnel or filter support and the liquid poured inside the paper. Where a more rapid filter is required two plain filters are placed one inside the other, leaving the three sides of the one in contact with the single side of the other and vice versa. It may seem a little surprising at first thought that the process would be more rapid where two papers are used, but when we take into consideration the fact that the passage of the liquid through the paper is due to capiliary attraction, the same force which causes the oil to rise in the wick of an ordinary lamp, it immediately becomes plain that as we increase the attraction by several thicknesses of paper, its action will be correspondingly increased.

The funnel used should be made at an angle of 60 degrees, which will insure a contact between the paper and the funnel at every point except the extreme tip. Otherwise the paper is likely to break at the unsupported points from the weight of the liquid pressing upon it after it has been

moistened. Ordinary funnels are made with this angle so little or no trouble is experienced on this point.

Ribbed funnels are often used instead of plain ones with a view to hastening the operation and sometimes bits of straw are placed between the paper and the walls of the funnel for the same purpose. A little experience will teach you the advantages or disadvantages of thes makeshifts.

The folding of a plaited filter is a very difficult thing to learn from printed directions, even when fully illustrated, and I shall, therefore, not attempt to give any instructions for doing it. Any druggist will show you how to do this, and you will readily learn the method by seeing it done. However, you will have little or no occasion for this method of folding, the one previously described answering every purpose of ordinary manufacturing.

It is always advisable to wet the filter paper after placing it in the funnel before pouring the liquid to be filtered, into it. This will hasten the work and insure an evenly working filter.

For heavy liquids, syrups, etc., paper filters are not adapted. Paper pulp, asbestos, sand, charcoal and even excelsior are used as a filtering medium for this class of products.

For general manufacturing purposes, filtering funnels made of tin will be found entirely satisfactory. However, for filtering caustic substances, such as acids and strong alkalies, funnels of glass or hard rubber should be used. As these are not affected by such liquids they are to be preferred to tin funnels for filtering them, as the latter would soon become corroded and spoiled as well as being likely to leave tin or iron salts in the filtrate which might prove objectionable.

It should be borne in mind that filtration does not remove anything which may be in actual solution from the liquid. It only removes matter which is insoluble, either

from its nature or from the fact that the liquid in which it is contained is already saturated with the substance.

Distillation is the process of separating liquids from solids which they may hold in solution and liquids of different densities or degrees of voltility from each other by means of first vaporizing the liquids and then condensing the vapors by the application of cold.

Liquids are converted into vapors by the application of heat, the degree of heat necessary to vaporize them varying with different liquids. Those which vaporize at low temperatures are said to be more volatile than those requiring higher temperatures to vaporize them.

Several different forms of apparatus are used in the process of distillation, according to the nature of the work to be done and the quantity of material to be handled. All these forms of apparatus work on the same general principle, i. e., the conversion of the liquids into vapors by means of heat and the condensing of this vapor into liquid form by the application of cold. In distilling on a small scale, retorts or flasks are generally used, while in working with large quantities of materials an apparatus known as a "still" is employed.

A retort is a long necked glass flask in which the neck has been bent over so as to form an acute angle with the body of the flask. Some of these are provided with an opening at the top of the body, such forms being known as "tubulated retorts," while others have no such opening and are called "plain retorts." In the tubulated form the liquid to be distilled is introduced through the orifice at the top and this opening is then closed with a ground glass stopper, before applying the heat. In the plain retort the liquid is introduced through the neck or stem by means of a long stemmed funnel. For certain purposes retorts may be of other materials than glass, such as earthenware, platinum, iron, etc

Most chemists prefer using a flask for distilling purposes instead of a retort on account of the greater ease with which it may be cleansed after use. A large sized flask with a flat bottom is selected and fitted with a rubber stopper perforated with three holes. In one of these a bent tube is placed to carry away the vapors and the other openings are for a charging tube and a thermometer. The liquid to be distilled is introduced into the flask through the charging tube which should reach well down toward the bottom of the flask. Heat is then applied to the bottom of the flask and as soon as the liquid reaches its boiling point, the vapor will collect in the upper portion and pass out through the bent tube. In using a distilling flask it is usually placed on a small tripod stand over an alcohol or Bunsen burner, being protected from direct contact with the flame by a piece of wire screen or asbestos paper. This precaution is used to insure even heating of the flask and to prevent breakage from different portions being heated unequally.

In condensing the vapor into liquid form various methods are used. When working on a small scale the most convenient is the use of what is known as a Liebig's condenser, which consists of a glass tube surrounded for a part of its length with a chamber through which cold water is kept flowing during the process of distillation. Other methods are to place the receiver on a block of ice, keeping cold water running over the receiver or to wrap the receiver in a towel kept saturated with cold water.

As a receiver a flask is most convenient but any ordinary bottle may be used, or in case you are working with a Liebig's condenser, you may use a beaker, cup or anything of that description.

A still consists of a chamber for heating the liquid and a condensing tube, which is commonly termed a "worm." Stills are often constructed of copper or iron and the coiled tube used for condensing the vapor is generally of block tin.

This tube passes through a chamber kept filled with cold water.

Liquids having different boiling points may be separated from each other by the process known as fractional distillation. This depends upon the principle that when the boiling point of the most volatile constituent is reached, the mixture will not increase materially in temperature until this constituent has passed off as vapor. In working with the distilling flesk, the temperature indicated by the thermometer when the vapor begins to pass over is noted and the heat is applied steadily. When the most volatile portion of the liquid has completely evaporated, the thermometer will indicate an increase in temperature. The receiver should be changed and this process repeated as often as the thermometer indicates that the boiling point of the mixture has increased.

By this method we can separate alcohol from water, or in a mixture of ether, alcohol and water the liquids may be separated almost perfectly by careful fractional distillation, passing over in the order in which they are named.

Fractional distillation is utilized in chemical analysis in separating the ingredients of such preparations as liniments. It also forms a means of determining the quantity of alcohol present in any liquid mixture.

About the only use the average mixer will make of the process of distillation is in the production of distilled water which is necessary in the preparation of certain products. A suitable apparatus for doing this work may be purchased from any dealer in pharmaceutical apparatus at a reasonable cost and the directions accompanying same will enable any one to use it without previous experience.

Clarification is the removal of impurities from liquids by means of the addition of some substance such as egg albumen, milk, or a solution of gelatine which coagulates and entangles the impurities contained, thus precipitating them

and leaving the liquid clear. This is applied in the manufacture of certain syrups and the process is a familiar one to most persons from having seen the white of an egg used in clarifying coffee. This term is also applied to the process of decolorizing syrups, etc., by means of filtering through animal charcoal.

Percolation is the process of extracting certain principles from roots, barks, herbs, etc., by means of passing a liquid through the ground drugs packed in an apparatus known as a percolator. For further information on this process, see the article on percolators in the section treating on apparatus.

Maceration is the process of extracting the soluble portions of any herb, drug or other substance, by soaking the powdered or finely divided substance in the menstrum until it is thoroughly penetrated and the soluble portion dissolved. Where gentle heat is employed during the process, it is then called digestion.

Infusion differs from maceration only in that the menstrum is used at a boiling temperature. In some cases the menstrum is poured, boiling hot, over the substance to be extracted and in others, the substance is boiled in the menstrum until the soluble portions are extracted.

SECTION IV

WEIGHTS AND MEASURES.

The subject of meterology is of the utmost importance to everyone who presumes to undertake the compounding of proprietary articles of any nature whatever. This term, although it has a formidable sound, means simply the Science of Weights and Measures.

In early times almost every province and chief city had its own system of measures and these were neither definite nor uniform. This variety of weights and measures of different countries proved a serious embarrassment to commerce and it became evident that uniformity in these important matters was desirable. Therefore, the leading civilized nations established definite systems of weight and measure, based upon standards fixed by law and having a definite and constant relation to those in use in other countries. France and England were the leaders in this movement and a uniform system of weights and measures was adopted by the U. S. government as early as 1834.

In England and the United States the system of weights in general use is what is known as the Old Form or English System. This includes avoirdupois weight, which is used for all ordinary purposes of weighing and Troy and Apothecaries weights which are used chiefly in the jewelry and drug trades, respectively. Troy and Apothecaries weights are identical except as regards the division of the ounce, the Troy being divided into pennyweights and grains, while

the Apothecaries is divided into drams, scruples and grains, as shown by the following table:

Both these systems of weight differ for the avoirdupois, not only in the number of ounces to the pound, but also in the weight of the ounce, itself, the Troy and Apothecaries ounce containing 480 grains, while the Avoirdupois ounce has but 437½ grains, thus making the Troy or Apothecaries pound 5,760 and the Avoirdupois pound 7,000 grains.

AVOIRDUPOIS WEIGHT.

16 ounces make 1 pound.....lb.
100 pounds make 1 hundredweight.....cwt.
20 cwt. or 2000 pounds make 1 ton.....T.

TROY WEIGHT.

24 grains make 1 pennyweight.....dwt.
20 pennyweights make 1 ounce.....oz.
12 ounces make 1 pound.....lb.

APOTHECARIES' WEIGHT.

20 grains make 1 scruple.....sc. or ℈
3 scruples make 1 dram.....dr. or ʒ
8 drams make 1 ounce.....oz. or ℥
12 ounces make 1 pound.....lb. or ℔

COMPARATIVE TABLE OF WEIGHTS.

	Troy	Avoirdupois	Apothecaries
1 pound	5760 grains	7000 grains	5760 grains
1 ounce	480 grains	437½ grains	480 grains

From the above table it will be observed that 144 pounds Avoirdupois are equal to 175 pounds Troy or Apothecaries.

Apothecaries weight is used simply in mixing medicines and similar products, drugs and chemicals always being bought and sold by Avoirdupois weight. This fact should be kept in mind, or otherwise it may lead to errors in mixing.

As a general rule, it is always to be assumed that unless otherwise directed, solids are to be taken by weight and

liquids by measure in any formula you may be using. In a few formulas it is intended that the liquids should be taken by weight also, but in such cases this is always stated. Solids by weight and liquids by measure is the uniform rule with all the formulas in this volume.

In weighing liquids an ordinary balance scale is used and the liquids are weighed in a vessel of known weight. This is often referred to as a "tared vessel." In weighing, allowance must always be made for the weight of the container and to save computation a weight which will exactly balance this is used on the opposite side of the scale. By this method, ignoring the weight used to counterbalance the container, the weight obtained will be exactly that of the liquid itself.

MEASURES OF CAPACITY.

Two tables are in common use, i. e., Liquid and Apothcaries Fluid Measure.

LIQUID MEASURE.

4	gills make	1 pint
2	pints make	1 quart
4	quarts make	1 gallon
31½	gallons make	1 barrel
2	barrels or 63 gallons make	1 hogshead

APOTHECARIES FLUID MEASURE.

60	minims make	1 fluid drachm
8	fluid drachms make	1 fluid ounce
16	fluid ounces make	1 pint
8	pints make	1 quart

It should be kept in mind that the English pint contains 20 ounces instead of 16 as does our own. This is of especial importance in handling formulas of English origin, as it can be readily seen that to vary the liquid content of a mixture by 1-5 as would occur by using the American pint when the English pint was intended, would tend to pro-

duce something entirely different from what was intended by the originator of the formula.

In measuring liquids a glass graduate is indispensible. These should always be used where exact quantities are essential, and especially where the liquid being measured is an active ingredient in the preparation into whose composition it enters. For measuring alcohol, syrup, etc., in quantities of one pint and upward, the ordinary tin measuring vessels are suitable. It is a good idea to test any of these that you may have by checking them against your glass graduate.

Small quantities of both liquids and solids are generally handled most conveniently by diluting with definite quantities of some other ingredient used in the preparation being compounded and then using a sufficient quantity of the resulting mixture to get the required amount of the substance. Errors are less likely to occur in weighing amounts of five grains or upward than when dealing with smaller quantities and this is especially true in cases where one doing the weighing is not accustomed to such delicate operations. For example, suppose a formula calls for one-half grain of morphine. Dissolve some easily weighed quantity, say five grains in five fluid drachms of water. Now each fluid drachm represents one grain of morphine and by using one-half fluid drachm of the mixture you would get the one-half grain of morphine required. If two-thirds grain was called for it would only be necessary to use some multiple of three in determining the quantity of solvent to be used, as 15 fluid drachms. Then each fluid drachm would contain one-third grain of morphine and by using two fluid drachms the desired quantity would be obtained.

The same method is used in dealing with minute quantities of dry substances. For example, we desire to put up a mixture containing 1-10 grain of morphine. We rub up any easily determined quantity of the morphine, as 1 grain

with ten grains of milk sugar, for example, now 1 grain of the compound will contain, if the mixing has been properly done, exactly 1-10 grain of morphine.

THE METRIC SYSTEM.

The Metric System which is used almost entirely on the continent of Europe is gradually coming into favor in this country and has for many years been used almost to the exclusion of all other systems in high class scientific work. The advantages of this system lie principally in the ease with which computations may be made with it, it simply requiring the moving of a decimal point to the right or left to reduce the denomination to another, instead of the tedious calculations involved in changing from one denomination to another under the so-called English system of weights and measures.

Many formulas of foreign origin, use the Metric system in stating proportions to be used. In dealing with such formulas, these measures may be converted into the old form by a mathematical calculation or, as is more generally the case, by means of a table prepared for the purpose. Such a table will be found in the appendix to this volume.

The conversion of the Metric into the Old form is likely to result in getting some difficult quantities to weigh or measure. The rule sometimes stated that the dram equals 15 grains of a solid or powder or 15 drops of a liquid is far from being correct, and while it might work in some cases where exactness of weight or measure is not essential, I should hesitate to use it in any operation where the quality of the product depends upon the chemical reaction between the ingredients used, as in such cases it is usually necessary to use exactly enough of the ingredients in question to bring about the desired effect and any excess of either of them might result in entirely spoiling the product.

If you use an ordinary balance scale, you can solve the

problem very easily so far as handling formulas where the quantities of the ingredients are expressed in the Metric System, by purchasing a set of Metric Weights and using these instead of the Old Form Weights. Glass graduates for measuring liquids are generally marked both for the Apothecaries Fluid and the Metric measures, so no trouble should occur in getting the quantity of liquids specified, it only being necessary to take your readings on the Metric side of the glass.

The theory of the Metric System is simple in the extreme, being based entirely on the decimal scale or scale of ten. That is, ten units of any given denomination make one of the next larger. Our own table of United States money is based on the same principle.

The unit of weight is the gram, and the unit of liquid measure the litre. The gram is the weight of a cubic centimetre of distilled water at the standard temperature.

The only tables which would be used by the average manufacturer are those of weight and capacity. They are as follows:

METRIC TABLE OF WEIGHT.

10 milligrams make	1 centigram
10 centigrams make	1 decigram
10 decigrams make	1 gram
10 grams make	1 decagram
10 decagrams make	1 hectogram
10 hectograms make	1 kilogram
10 kilograms make	1 myriagram

In examining this table it will be noted that the terms used to express the different quantities are made up of the name of the unit of weight, i. e., the gram, and the Latin and Greek prefixes.

The Latin prefixes deci, centi, milli denote respectively 1-10, 1-100 and 1-1000 (in the decimal form 0.1, 0.01,

0.001) of a unit. Thus decigram means 1-10, centigram 1-100 of a gram and so on.

The Greek prefixes, deca, hecto, kilo and myria, are the Greek numerals denoting 10, 100, 1,000, and 10,000. Thus a Decagram would be 10 grams and a Kilogram 1,000 grams.

Remington, in his work on Practical Pharmacy, gives the following method of remembering this easily:

G	I	L	D
Greek	Increase	Latin	Decrease.

It will be noted that the initials of these words spell the very common word *gild.* Therefore, by committing the prefixes to memory and keeping in mind this little "memory aid" it will be easy to construct the tables.

Having once learned this set of prefixes, it is a most simple matter to construct any table of the Metric System. These prefixes occur in every table and are joined to the unit in the same order as in the table of weight. This gives us the table Measures of Capacity as follows:

Unit of Measure—The Liter.

10 milliliters make	1 deciliter
10 deciliters make	1 liter
10 liters make	1 decaliter
10 decaliters make	1 hectoliter
10 hectoliters make	1 kiloliter

Liquids are almost universally expressed in formulas in cubic centimeters. Following out the same course of reasoning applied to the tables given above, it will be noted that a centimeter is equal to 1-100 of a meter, and a cubic centimeter would therefore, be the equivalent of a cube 1-100 of a meter on each edge.

The liter, is a cubic decimeter or 1,000 cubic centimeters and accordingly a liter of distilled water will weigh 1,000 grams. The liter is very nearly the same as our quart.

While the explanation given may seem somewhat com-

plicated on first examination, it will be found that a very little study will make the matter perfectly clear. The use of the table in the appendix will make the conversion of measures to the Old Form, or vice versa, a very simple matter. This table of equivalents has been worked out with great care and may be depended upon as being entirely accurate.

SPECIFIC GRAVITY.

Specific Gravity is the weight of one substance compared with the weight of an equal bulk (volume) of some other substance taken as a standard. This subject is not as difficult to understand as the average mixer has always tried to make himself believe. When we say that gold is, bulk for bulk, 19.298 times as heavy as water we have stated the exact meaning of the statement, "The specific gravity of gold is 19.298." In determining the specific gravity of all liquids and solids, distilled water at a temperature of 60° Fahr. is the standard with which they are compared. The specific gravity of gases is usually stated in terms of their weight compared with an equal volume of pure hydrogen under similar conditions of temperature and pressure.

As stated above, the specific gravity of gold is 19.298. By means of these figures we are enabled to compute the weight of any given quantity of gold by comparing it with the weight of an equal bulk of water. Thus, a cubic foot of distilled water weighs 62½ pounds, and gold being 19.298 times as heavy, a cubic foot, i. e., a block 12x12 inches will weigh 19.298 times 62½, or 1206.125 pounds.

In ordinary manufacturing, it is so seldom required to compute the specific gravity of solids that no rules for this process will be given here. Any text book on Natural Philosophy or Chemistry will explain the process in detail and in addition most of them give tables showing the specific gravity of all the principal minerals.

The specific gravity of liquids may be determined by

simply weighing. In this process what is known as a tared flask or bottle, i. e., one of which the exact weight is known, is used. This is filled with water and weighed. The water is then poured out and the bottle again filled, this time with the liquid whose specific gravity we are desirous of determining and the bottle and contents are weighed again. Deducting the weight of the bottle from its weight when filled with each of these liquids will give the exact weight of the liquids themselves. Now by dividing the weight of the liquid we are working with, by the weight of the water, we obtain its exact specific gravity.

For example, we desire to know the specific gravity of a certain liquid. In order to determine this we select a bottle and on weighing this find its weight to be, say three drams. Filling it with water and again weighing, we find that bottle and contents weigh 2½ ounces. Filling the same bottle with the second liquid and weighing, we obtain as its weight 3¼ ounces. Now deducting the weight of the bottle from the results of each weighing, we find the net weight of the water to be 17 drams (2 ounces, 1 dram) and of the second liquid to be 23 drams (2 ounces, 7 drams.) Now, dividing 23 by 17, we obtain as a result 1.352, the specific gravity of the liquid being tested.

In practice it is customary to use what is known as a specific gravity flask. This is a thin glass flask of such capacity that when filled to a marked point on the neck of the flask it will contain 1,000 cubic meters of water, which will weigh, as may be seen by consulting the explanation of the Metric System previously given, exactly 1,000 grams. With the specific gravity flask usually comes a metal weight which placed on the opposite pan of the scales will exactly counterbalance the bottle when empty. In the absence of such a counterbalance, a small beaker or even a glass vial may be placed on the opposite pan of the scales and weighted with water, mercury or fine shot until it exactly balances

the flask. Having placed the counterbalance on one pan of the scales, the flask filled to the marked point with the liquid being tested, is placed on the opposite pan. The weight being noted, simply dividing by 1,000, which merely requires the pointing off of three decimal places counting from the right of the number representing the weight, will give the specific gravity desired.

A much simpler and more rapid method of determining the specific gravity of liquids and the one most commonly used is by means of an instrument known as a hydrometer. While this method is not as accurate as that of direct weighing, it is sufficiently exact for all ordinary purposes. In chemical analysis and other work where the exact specific gravity is required the process of direct weighing is always used.

The most common form of hydrometer is simply a glass tube, provided with two bulbs and closed at the top. The lower of the two bulbs contains a sufficient quantity of mercury or fine shot to cause the instrument to float upright when placed in a liquid, the second bulb being merely an air chamber provided to give the instrument the necessary floating qualities. The stem or upper part of the instrument is graduated in such a way that the reading will indicate the density if the liquid in which it is placed, compared with that of an equal volume of water, in other words will give the specific gravity of the liquid.

In using the hydrometer, the liquid to be tested is poured into a cylindrical glass jar, tall enough to allow the instrument to float. The temperature of the liquid is taken by means of a thermometer and the hydrometer is then immersed in the liquid. The mark on the hydrometer stem, level with the surface of the liquid, is read off. The matter of temperature is an important one, and it is necessary to either bring the liquid to the standard temperature or else make allowance for the effect of temperature upon its

density. The firm from whom you buy your hydrometer will provide you with a printed table showing how to convert the hydrometer reading at any given temperature into the real specific gravity of the liquid.

It will be readily seen that if the hydrometer floats in pure water with unity (1) at the surface, in liquids heavier than water it will not sink as deeply,while in liquids lighter than water it will sink to a greater depth. Possibly the following example will make the matter clearer.

It is a well known fact that we can dissolve a considerable quantity of any soluble salt in a liquid without increasing its bulk noticeably. Most persons are familiar with the old trick of filling a glass to the brim with water and then adding to it a large quantity of common salt without causing the glass to overflow. It is self evident, however, that although the bulk of the liquid remains the same, its weight has been increased by exactly the weight of the substance added. Therefore, a saturated solution of common salt will weigh more than an equal bulk of clear water. The liquid being denser than the water, the hydrometer will not sink as far into it as it does in the pure water, giving us a higher reading which, when the temperature corrections are made, if such are required, will represent the specific gravity of the salt solution.

On the other hand, if we mix some substance lighter than water with it, its density will be decreased. Thus a mixture of alcohol and water will weigh less, bulk for bulk, than water alone and the hydrometer reading will vary accordingly.

Several styles of hydrometers are on the market, designed for various purposes. We find the ordinary Baume's hydrometer used in testing the strength of lyes in soap making, the lactometer, designed especially for testing milk, the acidometer for determining the strength of acid solutions, the alcoholometer for determining the alcoholic strength of

liquors and numerous other forms which, while they are adapted each for its special purpose, all depend upon exactly the same principles for their results, the difference being simply in the method of graduating the stem, each scale being designed to facilitate the use of the instrument for its specific purpose.

SECTION V

TOILET PREPARATIONS.

The term Toilet Preparations covers an extremely large and varied list of specialties. Aside from the numerous creams, powders and lotions which must be considered under this head, all cosmetic preparations of any nature whatever together with perfumes fall naturally under this classification.

In no other line of proprietary manufacture is there a greater opportunity of building up a permanent and profitable business than with toilet specialties. They appeal to every rank in life from the lowest to the ultra-fashionable, for the desire to be beautiful and attractive is not confined to any one class, but is inherent in womankind. The work of manufacturing this class of specialties is cleanly and pleasant and it is in the putting up of cosmetic preparations that the greatest opportunity for exhibiting taste and skill in labelling and packing exists.

For many years France held first place in the production of all preparations for "my lady beautiful," but with the progress of knowledge and the constantly increasing demand for cosmetic specialties, America has forged rapidly to the front in this line and to-day many American products compare favorably with the best of their French prototypes and it is no unusual thing, even in the city of Paris, to find them displayed in the perfumer's windows, side by side with the best specimens of the art of the French perfumer.

There is no reason why we should not be able to produce a line of cosmetic preparations in this country which will

stand second to none. The one thing which has worked most strongly against this is the extreme commercialism which characterizes most American industries. Instead of striving for the highest possible quality in their products, many manufacturers have considered anything good enough to offer to the public so long as it was cheap to produce. A marked contrast will be noted in comparing the advertising of American and French manufacturers. In the former cheapness or the bargain element is often held out as the principal inducement for buying, while with the latter, "quality" is always the burden of their song. So long as low price is the chief factor in our advertising we can never hope to attain the highest degree of perfection in our products. Probably one reason why French preparations have won so much popularity is that they are not "cheap." It is not at all unusual to find these goods priced at the equivalent of two to five dollars of our money for a small package which the American manufacturer would be likely to offer at fifty cents or at most one dollar. Cheapness, while it might be a factor in furthering the sale of stove polish or laundry soap, is not a strong argument in favor of either medicines or toilet specialties. The average woman would not hesitate to pay a dollar for a jar of massage cream, but few of them would be tempted to buy such a product at ten cents. The bargain instinct is not strong enough to induce the person of good judgment to go in for cheapness when purchasing products designed to promote health or beauty.

The "specialist" who charges fifty to one hundred dollars for performing a comparitively simple surgical operation will generally be found to have more business in this line than the general practitioner who, while he is capable of doing the work equally as well, would not think of charging over ten to twenty-five dollars. The very fact that a good round price is asked for anything in the medical or toilet

line is one of the strongest factors in convincing the public of its merits, and unless you can convince them that your products are the best of their class, your outlook for gaining or holding their trade is far from bright.

I do not mean to convey the idea that any good toilet preparations are particularly expensive to produce. On the other hand the margin of profit on this class of goods is higher than on most other lines, even though a high grade of article is offered. I simply wish to impress the would-be mixer of cosmetics that in order to permanently retain his trade he must offer them something worth having, even though it may cost a cent or two more per bottle to make than the "mud" which has been so often offered under the most alluring of labels. Indeed, the term "mud" would rather dignify certain mixtures which have been foisted upon the public, for not only have they been most inelegant from a pharmaceutical standpoint but many of them have been positively harmful. I have in mind one young lady, who in attempting to get rid of a few insignificant freckles by the use of a certain highly advertised "face bleach" succeeded not only in removing the freckles but most of the cuticle from her face, and although this occurred several years ago she still carries the marks of the experience in a series of red spots marking the location of the blisters which were made by too strong a solution of corrosive sublimate sold under the name of "beautifier." Such preparations cannot be too strongly condemned.

One often hears the saying "Time changes all things" and this is quite as true as regards toilet preparations as of other things. From the hair oils and greasy cosmetics of twenty years ago to the modern Antiseptic Hair Tonics and Greaseless Massage Creams of to-day, is a long step, and the pathway between these two extremes is marked by thousands of cosmetic preparations, good, bad and indifferent,

all of which have attained a greater or less degree of popularity.

Assuming that you have fixed upon a formula which will produce a high grade toilet preparation, much of your success in marketing this will depend upon the style in which it is put up. While attractiveness of appearance is desirable with every class of proprietary articles, with toilet specialties it is an absolute necessity, if you expect to get your share of the trade. These goods are designed to appeal especially to women and that the feminine portion of humanity are partial to attractive appearing articles, goes without saying. No mater how meritorious your product may be, it will be likely to stand on the dealer's shelves unless it is put up in attractive style,while other preparations of much poorer quality will meet with a ready sale. Naturally, unless the quality is good enough to merit repeated buying, the most that the attractive package can do is to make one sale, but quality and attractiveness form a team which will carry any preparation of this kind to success.

The style of package and the label will, of course, vary with the nature of the article they accompany and so long as they are attractive in appearance the exact pattern does not matter greatly. The ordinary French square bottle, or better the so-called "rounded square," i. e., a square bottle with round corners, make good containers for liquid preparations and when properly labeled and wrapped make a package which will compare favorably with those containing a special shape bottle. Where a product is being extensively advertised it is always advisable to make the package distinctive and in cases where the business will justify it, I would recommend having a special shape of bottle blown especially for your purpose. Any firm of bottle makers or jobbers in glassware will quote prices on work of this kind and are generally glad to offer suggestions regarding the best shapes

for particular purposes. They nearly all carry a line of stock bottles designed for the various kinds of toilet specialties, such as lotions, hair tonic, etc., the price of which is not greatly in excess of that of ordinary bottles. It is always advisable to keep away from the ordinary oval prescription bottle, for these have a tendency to cheapen the appearance of any preparation they may contain. I suppose this comes from their being so common on the same principle that familiarity is said to breed contempt.

Either a high grade printed label or a lithographed one should be used on all toilet preparations. Good printing done by a man who understands his business is but little inferior to the cheaper grades of lithograph work but does not compare with high class lithographs. There are a considerable number of firms who make a specialty of furnishing what are known as "stock" lithographed labels, in which the body design is the same in all for a particular product, simply the name and address being changed for each customer. These answer very well where a special lithographed label would be too expensive, but they lack individuality and distinctiveness which count so much toward fixing your products in the mind of the public.

Many forms of cosmetic preparations can be put up to advantage in collapsible tubes. In cases where these are adapted to your purpose they will be found to be both cheap and serviceable containers and some of these now being offered by the large manufacturers are really works of art. They are made in various colors and may be had with any design or trade mark embossed on them.

Where corks are used, always use the best. Glass stoppered bottles are particularly adapted to some preparations, as perfumes, and the metal top, cork stoppers are also extensively used. Where ordinary corks are used, a kid or corrugated paper cork cover will add much to the appearance of the package. These are inexpensive and the few

cents increase in cost per gross, will add dollars in appearance and selling qualities.

It is always advisable to study the styles of containers and packages used by other manufacturers of similar products. Do not make the mistake of becoming a mere imitator but rather seek to combine the best points of your competitors' styles with your own idea in such a way as to give you a distinctive style of your own.

INGREDIENTS COMMONLY USED IN TOILET PREPARATIONS.

BEESWAX.

Pure beeswax in its natural state is yellow in color, possessing a characteristic odor and having a melting point of 145 Fahr. For toilet specialties white wax or bleached beeswax is commonly used. This is prepared by exposing thin sheets of yellow wax to the action of the sunlight until it loses its color. During the bleaching process the odor is changed somewhat and white wax has a melting point slightly higher than the unbleached variety (about 148 Fahr.)

Beeswax is sometimes adulterated with paraffin, but this can generally be detected by the lower melting point.

SPERMACETTI.

This substance is the solid wax which separates out of sperm oil, which in turn is obtained from the sperm whale. When pure it is perfectly white in color and possesses a peculiar crystaline appearance which, however, disappears when mixed with other fats. It is but slightly soluble in alcohol, or benzine but is readily soluble in ether or chloroform. The melting point is from 115 to 120 Fahr., and it sometimes becomes rancid upon exposure. It is largely used in the manufacture of cold creams and similar preparations.

COCOA BUTTER.

Cocoa butter, or oil of theobroma, as it is sometimes called, is a vegetable product derived from the cocoa bean. It melts at the temperature of the human body, 95 to 98 Fahr., which property particularly adapts it for use in the manufacture of suppositories, and it is also used in salves and ointments to some extent. Unlike most substances, cocoa butter possesses the peculiar property of passing from the solid to the liquid state without undergoing a transitional softening and within the limit of three degrees of temperature. Its particular use in toilet preparations is to give them smoothness and it also possesses some reputation as a skin food or developer. It is claimed by some that it has a tendency to produce a growth of hair upon the parts where it is used and for this reason is considered by these parties as objectionable in cosmetics for use on the face.

STEARIC ACID.

This is a product which has quite recently come into notice especially as an ingredient in the so-called greaseless or vanishing creams. These creams are, in fact, soaps, produced by the action of some of the alkaline carbonates, or in some cases of the caustic alkalies upon the stearic acid. It has a melting point of 133 Fahr., and is occasionally used as a hardening element in creams, although in its unsaponified state it is likely to produce roughness on account of its crystaline structure.

Stearic acid is a product of lard or tallow and is made by heating the washed fatty acids of these fats to the melting point, running them into tin dishes or troughs and storing at a temperature of 68 to 86 Fahr. until the stearic acid and palmitic acids crystalize out. This is then pressed, remelted and purified several times until a perfectly white, pure product is obtained.

LARD.

This substance is not now used as largely in pharma-

ceutical work as it was in past years. It formerly entered quite largely into the composition of ointment bases, cold cream, etc., but has been largely replaced by petrolatum. Lard possesses the disadvantage of readily becoming rancid and has practically no qualities to recommend it which are not possesed by petrolatum.

To overcome the tendency to undergo putrefactive changes, the lard is sometimes treated with benzoin forming what is known as benzoinated lard. The process of making this is as follows:

Benzoin, in coarse powder	2 drams
Lard	1 pound av.

Melt the lard by means of a water bath; tie the benzoin loosely in a piece of coarse muslin, suspend it in the melted lard, and stirring frequently continue the heat for two hours, covering the vessel and not allowing the temperature to rise above 140° Fahr. Lastly, having removed the benzoin, strain the lard and stir occasionally while it cools. When benzoinated lard is to be used during warm weather 5 per cent. (or more if necessary) of the lard should be replaced by white wax.

Lard is insoluble in alcohol, entirely soluble in ether, chloroform, carbon bi-sulphide and benzine. Its melting is 100° Fahr. When melted it unites readily with wax, and paraffin in the melted state.

SUET OR TALLOW.

This fat is somewhat harder than lard, having a melting point of 115° Fahr. Like lard, it is prone to rancidity and is fast losing ground as an ingredient in pharmaceutical preparations. Mutton tallow, which formerly held considerable repute is now but little used, its principal employment being in Camphor Ice.

The following method of preparing suet for use in toilet preparations may prove of interest. Take of

Best Kidney Suet	5 pounds

Powdered Alum	1 ounce
Water	2 ounces

Chop the suet into fine pieces and place in an enameled or porcelain kettle with the alum and water. Heat slowly until the tallow is entirely melted, stirring occasionally to prevent burning. When entirely melted stir well for three to five minutes, then remove from the fire and strain through a piece of ordinary toweling. This process gives a product of snowy whiteness and almost as hard as wax. Prepared in this way it will keep for years without turning rancid.

LANOLIN (Adeps Lanae, or Wool Fat).

This is the fat contained in wool, separated and purified. It is considerably used in toilet preparations, although like cocoa butter it possesses the reputation of promoting the growth of hair, which renders it objectionable in facial cosmetics. Probably this property is largely imaginary but the idea is firmly enough fixed in the minds of the public that this substance is quite largely used as the base of the so-called Hair Growing Pomades, sold as a preventive and cure for baldness. Its principal virtue lies in its power of absorbing water which has led to its employment in cold creams and similar products. Used with discretion it adds smoothness to many toilet preparations and its property of being readily absorbed by the skin makes it a valuable ingredient in skin foods, bust developers and the like. It is unsuitable for use alone on account of its stickiness and also from the fact that its characteristic odor is not easily masked.

PETROLATUM.

This substance, which under such names as vaseline, petroleum jelly, etc., is very widely known, is of the greatest value in many toilet preparations. It is free from all tendency to turn rancid and generally speaking it is about the purest of the fats. It exerts no action upon the substances

with which it may be combined, i. e., is entirely neutral, and thus may be used in any combination whatever, where its employment seems desirable.

Petrolatum is not absorbed by the skin to any appreciable degree, hence has little value as a skin food or developer. It is especially useful in salves and ointments on account of this property which causes it to act as a protective.

It adds smoothness to many preparations and on account of its freedom from putrefactive changes is used largely in the manufacture of cold creams, such products being permanent.

Petrolatum occurs in different colors, ranging from snow white to a dark yellow or amber color. Its melting point is about 115° Fahr., although this varies slightly in different lots. It is very cheap and new uses for it are constantly being found.

PARAFFIN.

Like petrolatum, this is a product of petroleum, and it possesses the advantage of being staple, not entering into chemical combinations with other substances with which it is combined, and being very cheap. It is used largely to give hardness to ointments, etc., in which use it has replaced beeswax to a considerable degree. It is also used to some extent in toilet preparations, but simply as a vehicle only, possessing absolutely no therapeutic action except what can be ascribed to its protective powers. Melting point 130° Fahr.

PARAFFIN OIL (Liquid Petrolatum).

This is a bland, odorless, tasteless oil, derived from the refining of petroleum. It is largely used in medicine, forming a base for many medicated sprays, etc., used in the treatment of catarrh and other diseases. In toilet preparations, it replaces to some extent, almond and olive oils, possessing

the advantage of not being affected by the ingredients with which it is used and never turning rancid.

OLIVE AND ALMOND OILS.

These oils are derived from the fruits whose names they bear and enter largely into the composition of many different products. They are used in the preparation of the finest grades of soaps and as an ingredient in a majority of the cold creams, skin foods, etc., now on the market.

COCOANUT OIL.

This product is but little used in toilet preparations on account of the disagreeable odor which it possesses. It is used very extensively in soap making, but unless highly perfumed these soaps will impart the peculiar rancid odor of the oil to the skin of the user.

CASEIN.

Casein is a milk product, being that portion of milk which is coagulated by the use of acids or rennet. Its use as an ingredient in toilet preparations is comparitvely recent and is confined to massage creams of the rolling variety of which it is the chief constituent. These so-called rolling creams are composed almost entirely of moist casein with the addition of a little lanolin to give it the desired "drag" or "draw" and sufficient glycerin to prevent it from drying out too rapidly.

Casein may be purchased from almost any wholesale drug house, but for use in toilet preparations the commercial product, precipitated with sulphuric or hydrochloric acids is not as suitable as a special kind precipitated with alum or better with alum and magnesium sulphate.

The casein cream acts mechanically, forming little rolls under the pressure and manipulation of the fingers, which remove the accretions from the pores of the skin. Some skins are too delicate to admit of the use of such creams.

Casein readily decomposes under the action of the air, when in a moist state, and therefore such creams require a

suitable preservative, as boric acid or benzoate of soda, to prevent decomposition. They must also be protected from the air or they soon become dry and worthless.

GLYCERIN.

This is a by product of soap manufacture, existing in the so-called spent lyes, being separated from the fats during the process of saponification. Formerly it was a waste product,being thrown away in the lyes, but a scientific investigation of the composition of these waste products resulted in the discovery of the glycerin and led up to a study of the best methods of separating it from the lyes. It is very useful in a large number of toilet preparations, both liquids and pastes or creams, hair tonics, etc.

Glycerin gives smoothness to such preparations but used in excess is likely to make them sticky. It is hardly suitable for use alone on account of its strong affinity for water, giving it a tendency to make the skin rough. Diluted with its own bulk of rose water it forms the "Rosewater and Glycerine" mixture which has been a favorite toilet specialty since the days of our grandmothers. Used in moderation in hair tonics it softens the hair and gives it brilliancy.

Glycerin mixes with water and alcohol in all proportions but is likely to be found a "disturbing element" in fatty creams.

TRAGACANTH.

Gum tragacanth is the product of a small tree growing in the mountainous regions of Asia Minor. It comes to the market in several varieties, the best of which is in the form of small irregular flakes. The inferior qualities are generally in small rounded pieces. Tragacanth is used in pharmacy for making emulsions, in the manufacture of tablets and in many toilet preparations such as lotions, liquid creams, etc. It is also used as a paste for labeling on tin and glass. It consists of about 33 per cent. of a gum known

as bassorin which is insoluble and 53 per cent. of a soluble gum called arabin. When tragacanth is placed in cold water it soon softens by absorption of the water and swells to several times its original quantity. When used in lotions and creams, it is in the form of a thin mucilage and generally in combination with glycerine and alcohol. It will keep indefinitely in the dry form but when mixed with water it soon sours unless some preservative is added. Borax and salicylic acids and benzoate of soda are the preservatives most often used to preserve this product. Powdered tragacanth may be had if desired, but except where the saving of time is of importance the use of the flake variety will be found more satisfactory.

As straining mucilage of tragacanth is a very difficult process without the use of a strong press, it is always advisable to use care in the selection of this material, using only the best grade and rejecting any pieces which show specks of foreign matter. Where straining is absolutely necessary, it is best to dilute the mucilage with a large quantity of water and after straining evaporate the excess of water on a water bath.

QUINCE SEED.

This product is used for about the same purpose as tragacanth. Mucilage of quince seed is prepared by using about one dram of the seeds to twelve ounces of water. It may be made by simply soaking the seeds in the water for two or three hours but the process may be hastened by using boiling water. When this is used the mucilage is ready for use as soon as the mixture is cold. In either case, it should be strained through muslin without pressure to remove the seeds and any foreign matter which it may contain. Like mucilage of tragacanth this product soon sours unless a preservative is used. The preservatives recommended for tragacanth apply equally as well to this preparation.

IRISH MOSS.

This is a plant found upon stones and rocks on the western coast of Ireland and on some portions of the coast of Continental Europe. A similar product is also found along the southern coast of Massachusetts. When boiled with water for ten to fifteen minutes it forms a mucilage which may be used in the same manner as mucilage of tragacanth or quince seed. Use the same preservatives with this product as with the two preceeding ones.

BORAX.

This is the name commonly applied to sodium bi-borate, a substance which occurs naturally in California, Persia and some other parts of the world and is also produced artificially by combining boric acid or calcium borate with sodium carbonate. It is found in the market both in the form of prism shaped crystals and as a powder. It is readily soluble in water dissolving in 16 times its own weight of water at normal temperature, and in about one-half of its own weight of boiling water. From hot saturated solutions it crystalizes or precipitates on cooling. It is also soluble in alcohol. Borax enters largely into the composition of any cosmetic preparations including cold creams, lotions and hair tonics. It is used as a preservative and to give antiseptic properties to the preparations into whose composition it enters.

BORIC ACID.

This is a pure white powder of marked antiseptic and preservative powers. It is formed by decomposing borax in aqueous solution by boiling with either sulphuric or hydrochloric acid. On cooling the solution deposits crystals of boric acid which may be separated by filtration. These crystals are then purified by boiling with water and recrystalizing. It is soluble in water and alcohol. Borax and boric acid are readily detected in compounds by mixing a small

quantity of sulphuric acid with a portion of the preparation being tested, then pouring on alcohol and lighting it. The flame will show a green coloration if either borax or boric acid is present. Both borax and boric acid give a brown coloration on tumeric test paper.

SALICYLIC ACID.

This is a product of methyl salicylate (oil of wintergreen) and is also prepared artificially. It is used for antiseptic and preservative purposes. It is detected by means of a test solution of ferric-chloride with which it gives a violet coloration.

SODIUM BENZOATE.

This substance is prepared by adding benzoic acid to a hot solution of sodium carbonate until effervescence ceases. The solution is then evaporated to dryness, leaving the sodium benzoate in crystals or in granular form, according to whether it is stirred or not during the process of evaporation. Used only as a preservative.

TALC.

This product occurs in several grades, both Italian, French and Domestic being now on the market. These vary somewhat in color and purity. It enters largely into the composition of dusting and toilet powders, and in such preparations as foot-ease. It is also used as a clarifying agent in filtering certain liquids, a handful of the dry powder being thrown into the paper filter.

CHINA CLAY.

The use of this product in cosmetic manufacture is confined chiefly to the preparation known as rouge.

ZINC OXIDE.

This is generally prepared by calcining zinc carbonate. In its pure form it is used in toilet powders, massage creams and various other preparations. It enters largely into the

composition of the so-called "liquid powders" used for whitening the skin. It is insoluble in water or alcohol. Aside from its whitening effect it exerts a mild astringent and antiseptic action.

MAGNESIUM CARBONATE.

Two forms of this product enter into toilet products, being distinguished by the names of light and heavy magnesia. They are chemically identical but the former is only one-fourth as heavy as the latter. It is used in powders and lotions for its whitening effect, and is useful also in preparations for overcoming the odors arising from excessive perspiration on account of its absorbent properties.

BAY RUM.

True bay rum is prepared by the distillation of the leaves of the bay laurel, but the product most commonly found in commerce is a solution of the oil of bay in alcohol and water. It is generally colored a greenish yellow by the use of tincture, tumeric and indigo carmine.

A very good product may be prepared by the following formula:

Oil of Bay	3 drams
Alcohol	3 pints
Water	5 pints
Acetic Ether	1 dram

Mix the oil of bay with the alcohol, add the water and let stand for 24 hours. Then filter, using carbonate of magnesia as a clarifying agent. Lastly add the acetic ether. Color if desired with a little tincture of tumeric and solution of indigo carmine, using such proportions of each as will give the desired color.

ROSE WATER.

True rose water is the water which distills over with the oil in preparing oil of rose from the flower petals. Most of

the rose water on the market is prepared from the oil of rose as follows:

Oil of Rose	1 dram
Carbonate of Magnesia	2 ounces
Warm Water	1 gallon

Rub up the oil with the carbonate of magnesia in a mortar, then add the water in small quantities, mixing well after each addition. Let stand for three days in a moderately warm place, then filter.

MASSAGE CREAMS.

Of the various toilet specialties now on the market none enjoy a greater or more deserved popularity than massage creams. Although these occur in the market in almost infinite variety they may be divided into two general classes, i. e., rolling and non-rolling creams. Of the latter there are two types, greasy and non-greasy.

By a rolling cream, is meant one which when applied to the skin and massaged with the finger tips, gradually rolls up in small bits. These creams are valued on account of their cleansing properties, the effect of their use being to force all the dirt and accumulated sebaceous or oil matter out of the pores, but they are unsuited to extremely delicate skins on account of the amount of massage required to work them out properly proving irritating.

The basis of all this class of creams is casein. A special kind of this product is generally used, being precipitated by means of alum instead of with sulphuric or hydrochloric acids, which are generally used in the preparation of the commercial article.

The following general formula will fully cover the manufacture of this variety of creams:

Take any desired quantity of sweet, skimmed or separated milk, and precipitate the casein therefrom by adding to it one ounce of magnesium sulphate (epsom salts) to each

ten fluid ounces of milk used. The salts should be dissolved in the smallest possible quantity of warm water before mixing with the milk. Let stand for an hour and then gradually heat the mixture to 130° Fahr. Now add one-tenth as much alum as you have used magnesium sulphate. This also should be dissolved in warm water before adding. Continue the heat at this temperature until all the casein has separated. Care must be taken not to allow the heat to arise above 145° Fahr., as this would result in making the casein entirely too hard for its intended purpose. By placing the vessel containing the milk on the back part of a stove with a slow fire, the proper conditions will generally be obtained, but it is always safer to use a thermometer during the process. One of the floating thermometers made use of by cheesemakers is the best form for this as well as for many other purposes, as it may be left floating in the mixture during the entire process. This form of thermometer may be obtained from any dealer in dairy supplies or from most chemical supply houses.

When the casein is entirely separated which will be evidenced by the "whey" appearing clear, pour the contents of the vessel on a cheese cloth drainer and rinse with sufficient water to remove all traces of the alum and magnesium sulphate. Then press as dry as possible and it is ready for use.

In making the cream, the casein is mixed with sufficient boric acid to preserve it, about one ounce of the acid being used to five ounces of the casein. It may be colored by means of a little liquid carmine, and perfumed by the use of oil of bitter almonds or any other essential oil which may be preferred.

Many manufacturers add cocoa butter, in the proportion of one ounce to each ten ounces of casein, mixing them well together. Others add a small quantity of glycerine and still others make use of a little lanolin to obtain the desired

"drag" in rolling up when in use. By the term "drag" is meant a certain adhesiveness which adds greatly in removing the accumulated matters from the pores of the skin.

No iron clad rules for the manufacture of this product can be laid down, as each manufacturer will have his own ideas concerning the exact quality of the article he wishes to produce. By varying the quantities of materials used you will find that you are able to duplicate practically any of the rolling creams now on the market. The ability to thus modify a formula is something which should be cultivated by every manufacturer, as such ability will result in vastly improving the quality of his products and enable him to meet the exact requirements of his trade.

The above is what might be termed a "type formula." That is, one which represents a class of specialties rather than a single one. In this volume I shall offer many such formulas, believing they will be of greater service to the majority of my readers, than hard and fast formulas for a definite product. In all cases where type formulas are given the proportions of the different ingredients may be safely varied within any reasonable limits. In no case where bad results would be likely to follow any variation of the quantities will such formulas be given, but in all such instances the exact proportions of each ingredient required to make a perfect product will be clearly specified.

I make this explanation at this point in order to prevent anyone hastily condemning this work as not presenting formulas in which exact quantities are specified. Such specification of quantities is made in all cases where it is necessary or desirable to do so, but the principal object of this work, which is to educate the inexperienced mixer up to a point where he is capable of helping himself, would be defeated if only formulas were offered which allowed of no departure from the exact proportions specified. Information which will enable the manufacturer to duplicate closely any one

of a series of similar products is certainly more valuable than that which, while it might enable him to make a first class product, would still leave him in darkness as to the proper manner, varying this to meet any conditions which might arise in attempting to market it.

GREASELESS MASSAGE CREAMS.

During the past two or three years various creams have been placed on the market under the name of Greaseless or Disappearing Massage Creams. These are for the most part composed of stearic acid partially saponified by means of some alkali as potash or soda, the carbonates of these metals being the salt most frequently used for the purpose, combined with glycerine and sufficient perfume to give a pleasant odor. These creams when rubbed on the skin disappear in a short time, leaving the skin soft and smooth. For this reason they have been preferred by many to the older forms of greasy creams.

The term, greaseless cream, may be with propriety applied also to the rolling creams, previously described, where no fatty substance as cocoa butter has been combined with the casein.

In some of the stearic acid creams, starch is used, which combines with the glycerine to form glycerite of starch, which serves the double purpose of giving body to the cream and enhancing its emollient and soothing effect.

The appended formulas are typical of this preparation, both with and without the use of starch.

Stearic Acid	50 drams
Glycerin	15 ounces
Potassium Carbonate	5 drams
Sodium Bicarbonate	1 dram
Water	30 ounces

Heat all the ingredients together on a water bath for three hours, then remove from the fire and stir until cool.

When nearly cool add any desired perfume in sufficient quantities to give the desired odor.

GREASELESS CREAM WITH STARCH.

Preparation No. 1.

Stearic Acid	4 ounces
Carbonate of Potash	½ ounce
Water (hot)	8 ounces

Dissolve the carbonate in the water; melt the stearic acid on a water bath and when completely melted, add the solution of carbonate of potassium (hot) and stir until a complete saponification occurs.

Preparation No. 2.

Corn Starch	½ ounce
Glycerin	4 ounces
Water (cold)	1 ounce

Mix the starch to a smooth paste with the cold water, add the glycerine and heat with constant stirring until it forms a thick transparent mass. Mix preparations 1 and 2 on the water bath and beat until it forms a heavy smooth mass.

Preparation No. 3.

Glycerin	2 ounces
Water	5 ounces
Distilled Witch Hazel	2 ounces

Beat thoroughly together; let stand for an hour or two and beat again. Repeat this until it forms a light fluffy cream.

During the last beating stir in any perfume desired.

The consistence of this cream may be varied by using a larger or smaller proportion of water. By increasing the quantity of glycerin, a slower drying cream is produced.

GREASY OR FATTY MASSAGE CREAMS.

These preparations do not differ greatly from the cold

creams, the principal point of difference being that the water which is always present in a cold cream is sometimes omitted from the massage creams.

Almost any combination of oils, fats and waxes which willgive the proper consistence may be used in the production of this class of specialties. In fact it would be hard to devise a strictly new combination of this kind, as almost the entire realm of vegetable, animal and mineral oils and waxes have been made use of in these products. There are dozens of fatty creams on the market which differ from each other only in the coloring and perfume used and with a little experience it will be found comparitively easy to duplicate almost any of the widely advertised specialties of this nature so far as appearance and action is concerned.

The following formulas will produce preparations which are typical and by slight variation of the proportions of the different ingredients used, it will be found possible to produce a cream of any desired consistence:

Sweet Almond Oil	12 ounces
White Wax	4 ounces
Spermaceti	4 ounces
Lanolin	1 ounce
Oil of Rose Geranium	10 drops

Mix all together except the perfume, by means of a water bath and stir until a smooth uniform cream is produced. Add the oil of rose geranium when nearly cold. By varying the quantity of oil used, a cream of any desired consistence may be produced.

This formula may be modified by adding to the above, after melting the ingredients together, 20 grains of potassium carbonate dissolved in half an ounce of water. Stir well after this condition, then remove from the fire and continue stirring or beating until cold. The result of this slight change will be a cream which will differ materially from

the product of the formula as first given, both in appearance and action.

For a pink color, use a little eosin, dissolved in alcohol, or macerate half a dram of alkanet root in the oil for ten minutes before melting the ingredients together. In using this method of coloring it will be necessary to strain the oil before using to get rid of the particles of the alkanet it contains. To avoid the necessity of straining tie the alkanet root loosely in a piece of muslin and suspend it in the oil until the desired color is obtained.

White Petrolatum	12½ ounces
Paraffin Wax	1½ ounces
Borax in fine powder	½ ounce
Tincture of Benzoin	½ fluid ounce
Zinc Oxide	5 drams
Glycerin	5 drams
Perfume	Sufficient

Melt the petrolatum and paraffin on a water bath and add the borax and tincture of benzoin. Stir well for ten minutes, then strain through fine muslin and allow to cool without further stirring. Rub up the zinc oxide with the glycerin and add to the cooled mass, mixing in a mortar or with a spatula to uniform consistence.

By omitting the zinc oxide an emollient cream will be produced which will be free from any whitening effect. This product may be made softer or firmer by varying the proportions of wax used.

Cocoa Butter	8 ounces
Olive Oil	8 ounces
Tincture Benzoin	1 ounce
Alcohol	1 ounce
Oil of Rose	10 drops

Melt the cocoa butter with the oil on a water bath, add the tincture of benzoin and alcohol. Remove from the fire

and beat it until it begins to set, then add the perfume, mixing it well through the mass.

This product may be cheapened by substituting oil of rose geranium for the oil of rose. It may be given a pink color if such is desired by the addition of a little eosin dissolved in the alcohol, or by the use of a small quantity of alkanet root as directed in the first formula.

If desired harder add two ounces of white wax, melting it with the cocoa butter and oil.

White Petrolatum	14 ounces
Paraffin Wax	1 ounce
Lanolin	4 ounces
Water	6 ounces
Oil of Rose (artificial)	10 drops
Vanillin	4 grains
Alcohol	2 drams

Melt the vaseline, paraffin and lanolin on a water bath. When melted remove from the fire and allow to stand until it begins to cool. Then add the water boiling hot. Beat until cool. Dissolve the oil of rose and vanillin in the alcohol and stir it well through the mass.

If this cream is properly made it is a most excellent preparation but if carelessly put together is likely to resemble sour milk rather than a high grade toilet specialty.

COLD CREAMS.

These are among the oldest forms of cosmetic preparations, dating back to the second century of our era, at which time there flourished in Rome an Imperial Physician named Galenus to whom the origination of this specialty is credited. It is still referred to as Galen's cerate and the creams of to-day do not differ in any essential points of composition from those of ancient times. Generally speaking, a cold cream is a compound of oils or fats and wax, with which is incorporated a portion of water and such perfume as may

be desired. This addition of water is the characteristic feature of such creams and it is to this ingredient that they owe their cooling effect upon the skin.

It seems almost paradoxical that two substances which repel each other as do oil and water should combine in a homogenous mixture, but nevertheless a well made cold cream will remain indefinitely without separating. They differ from emulsions in that they contain nothing in the way of an emulsifying agent, unless the small quantity of borax which some formulas call for may be considered as such. This substance is intended primarily as a preservative but its slight alkaline action aids somewhat in combining the fats with the water, however, the chief factor in effecting this combination is the process of manipulation employed in making the cream.

One cold cream is official in the United States, Pharmacopia, under the title of Ointment of Rose Water. The process of making this is typical of that used in the production of all other creams. Therefore, I quote verbatim.

UNGUENTUM AQUAE ROSAE (Ointment of Rose Water).

Spermaceti	4⅔ ounces
White Wax	4⅝ ounces
Expressed Almond Oil	26¼ ounces
Stronger Rose Water	6½ ounces
Sodium Borate (Borax)	77 grains

The spermaceti and the white wax are to be reduced to fine shavings and melted at a moderate heat. The expressed oil of almond is then to be added and the mixture poured into a warmed, shallow wedgewood mortar, carefully adding without stirring, the whole of the stronger rose water in which the sodium borate has previously been uniformly soft and creamy.

In practice it will generally be found advisable to warm the water added in order to prevent chilling the wax and oil and the use of an egg beater generally accelerates the process of stirring. It is also advisable to use a water bath in melting the spermaceti and wax in order to avoid overheating. Personally, I find it more satisfactory to add the water in divided portions, beating each well into the mass before adding more. In making large quantities the time required for colling may be an hour or more but the heating must be constant up to the time the mixture assumes the appearance of a thick smooth cream. If perfumes further than rose water used are desired, they are added after the cream has thickened and become cool enough that there will be little or no loss of the perfuming material by evaporation. Oil of rose is the material most often used in perfuming this product. The artificial oil produces practically the same results as the natural otto and possesses the advantage of costing only one-half as much.

The rose water called for in most cold cream formulas may be replaced by distilled water and any desired perfume added. Elder flower or orange flower water may also be used instead of rose water, each imparting its characteristic odor to the cream.

One may be tempted at times, in making this preparation, to hasten the process of cooling by doing the beating in a cold room or by immersing the vessel in which the heating is done, in cold water, but either of these methods is practically certain to cause the cream to "break" or separate as it cools. When this occurs it seems to take place all at once and it becomes necessary to remelt the mixture and do the work of beating all over again.

The addition of a small percentage of lanolin to the cream will aid in combining the water with the fats, etc. This substance possesses considerable powers of absorbing water and aside from this gives to the cream a certain "body"

which many manufacturers consider desirable. The proportion to be used may be varied considerably but the sticky qualities of the lanolin must be borne in mind when using it.

The peculiar quantities of the ingredients mentioned in the foregoing formula are accounted for by the fact that the formula in its original form specifies the quantity of each ingredient in the Metric System, and in reducing this to the Old Form the results given are obtained. The following formula will be found easier to handle and will give quite as good results:

Oil of Sweet Almonds	8 fluid ounces
White Wax	1 ounce avoirdupois
Spermaceti	1 ounce avoirdupois
Rose Water	5 fluid ounces
Borax in fine powder	4 drams

Melt the wax and spermaceti with the sweet almond oil by means of a water bath; dissolve the borax in the rose water and when the melted wax is cooling add the solution of borax gradually, beating until a smooth cream is formed.

To the cold cream "base" made from the above formula, other ingredients such as camphor, menthol, etc., may be added if desired. Both camphor and menthol mix easily by adding while the mixture is still warm. Sometimes tincture of benzoin is added, in quantities of one-half ounce to the above quantity of cream. This gives it an agreeable odor and effectually overcomes the tendency of the product to turn rancid.

The following formulas will produce a variety of cold creams, which, differing as they do in appearance and in cost, will be found adapted to the needs of anyone desirous of manufacturing this product.

THEATRICAL COLD CREAM.

Under this name various products are sold. They are for the most part cheap creams made with liquid petrola-

tum (white paraffin oil) instead of with oil of almonds. This not only cheapens the product but overcomes the tendency to become rancid which is so pronounced in creams where almond oil is used.

The following is a formula devised by Mr. W. C. Alpers, some years ago, in a slightly modified form. It produces a fine cream at a very reasonable price:

White Wax	1 pound
White Paraffin Oil	4 pints
Rose Water	3 pints
Borax	1 ounce

Melt the wax, add the paraffin oil and continue to heat with constant stirring until they are well mixed. Use a water bath to avoid overheating. Dissolve the borax in the rose water with the aid of heat and while still warm gradually add to the melted wax and oil, stirring constantly until cold. If desired distilled water may be used in place of the rose water and any desired perfume added.

As white paraffin oil may be had from the Standard Oil Co., at any of its numerous agencies at about 35 to 50 cents per gallon and white wax at about 50 cents per pound the total cost of the finished product should not exceed 12 to 20 cents per pound. The paraffin oil is generally listed by the manufacturers as white petrolatum oil. It is also known as mineral glycerine.

If the cream is desired harder use more wax. As the quantity of water is somewhat high in this formula, it will require considerable care in making to combine this ingredient with the oil and wax but when properly done the cream is all that could be desired. The addition of a little lanolin, say one ounce to the above formula, will aid in combining the water and in case any serious trouble is experienced it may be found advisable to add 10 to 20 grains of potassium carbonate to the borax solution, before mixing with the melted wax, etc.

Another cream which will keep indefinitely without becoming rancid may be produced from the following formula:

Spermaceti	10	ounces
White Wax	10	ounces
Stearin	2	ounces
White Paraffin Oil	2½	pints
Water	20	fluid ounces
Borax	5½	drams
Perfuming Oils to suit		

Melt the solids together on a water bath, add the oil and mix well. Then add the water in which the borax has been dissolved, proceeding as directed in the formula for theatrical cold cream.

SEMI-GREASELESS COLD CREAM.

White Wax	5	ounces
Spermaceti	10	drams
White Petrolatum	3	ounces
White Paraffin Oil	18	ounces
Cocoanut Oil	10	drams
Powdered Borax	2½	drams
Powdered White Castile Soap	1	dram
Water	10	ounces
Perfume to suit		

Melt the solids on a water bath, add the oils and stir well. Dissolve the soap and borax in the water by means of heat and while still hot add gradually with contant stirring, to the wax and oil mixture. Continue to heat for five minutes, stirring all the time, then remove from the fire and stir until cold. As with other creams, this one may be made heavier by adding more wax.

The addition of a few grains of potassium carbonate (not more than one-fourth dram to the above formula is permissible) the cream may be rendered less greasy.

Keep in mind the fact that the wax and oil mixture should not be heated too hot. The use of a water bath pre-

cludes their being heated above the temperature of boiling water, when plain water is used in the outer vessel. The nearer the temperature of the wax and oil, the borax and soap solution is when added, the easier it will be found to combine the ingredients. This same rule applies to the making of all other cold creams.

SEMI-GREASELESS COLD CREAM, NO. 2.

Mineral Oil	8	ounces
White Wax	1½	ounces
Spermaceti	1¾	ounces
Ivory Soap	1	dram
Powdered Borax	3	drams
Distilled Water (hot)	4	ounces
Powdered Potato Starch	2	ounces
Violet for Cream	40	minims

First heat the white wax and spermaceti and the Mineral Oil, in a hot water bath, then dissolve the soap in two ounces of hot water, also the powdered borax in two ounces of hot water, keeping them hot. When the wax and spermaceti are perfectly dissolved in the mineral oil, add first the borax solution gradually, and next the soap solution, also gradually, and stir or whip for fifteen minutes. Then take starch which has been previously sifted to a very fine powder, place in a mortar and gradually add the cream to the starch, lastly add the perfume oil.

For a winter cream, use 10 per cent. less spermacetti.

PARAFFIN COLD CREAM.

White Wax	10 ounces
Paraffin Wax	10 ounces
White Paraffin Oil	54 ounces
Cocoa Butter	4 ounces
Borax	1 ounce
Water	20 ounces

Oil of Rose Geranium or other perfume to suit.

Put the wax, paraffin and cocoa butter on a water bath, add the oil and heat until all are well mixed. Dissolve the borax in the water by means of heat and having removed the wax and oil mixture from the fire, pour the hot solution of borax into it. Beat vigorously with an egg beater until perfectly mixed.

This gives a snow white product which is somewhat cheaper than those creams in which spermaceti is used, on account of the difference in cost between paraffin and this substance. If properly made it does not separate or turn rancid, but will remain pure white and fluffy for an indefinite period.

NON-GREASY COLD CREAM.

See formula under Greaseless Massage Creams.

GLYCERIN COLD CREAM.

Oil of Sweet Almonds	10	ounces
White Wax	1½	ounces
Glycerin	2½	ounces
Oil Rose Geranium	10	drops

Melt the wax with the oil and glycerine on a water bath, stirring until well mixed. Allow to cool, stirring in the perfuming oil when nearly cold. Any other desired perfume may be substituted for the oil of rose geranium.

WHITENING COLD CREAM.

White Petrolatum	12	ounces
White Wax	2	ounces
Spermaceti	10	drams
Bismuth Oxycloride	1½	ounces
Oil of Rose	12	drops
Oil Bitter Almonds	2	drops
Alcohol	1	ounce

Melt the wax with the spermaceti and petrolatum and while cooling rub up with the bismuth salt, mixing evenly. Dissolve the oils in the alcohol and stir into the mixture.

This is not, strictly speaking, a cold cream, and this is also true of the product of the preceeding formula. In both these the water, which is the essential element of all true cold creams, is lacking. These formulas are inserted under this head as they seem to fall naturally into this class of products.

In the formula last given, oxide of zinc may be substituted for the bismuth salt if desired. This will give practically the same whitening effect and cheapen the cost of production. This formula furnishes an ideal preparation for putting up in collapsible tubes.

LANOLIN COLD CREAM.

See the first and fourth formulas given under the head of Greasy or Fatty Massage Creams.

LIQUID CREAMS OR LOTIONS.

These are formulas designed to soften and whiten the skin, heal chapped hands and rough skin and to act generally as beautifiers. They are composed for the most part of mucilage of tragacanth or quince seed or a combination of these combined with glycerin and alcohol, and holding various antiseptics in solution. They are generally highly perfumed and make a good addition to any line of toilet specialties. The following formulas are typical:

QUINCE SEED LOTION.

Glycerin	6 ounces
Quince Seed	½ dram
Hot Water	21 ounces
Alcohol	5 ounces

Oil of Rose or other perfuming oil enough to suit

Place the quince seed in a bottle and pour over them eight ounces of the hot water, shake frequently until a mucilage is formed, then strain through muslin. To the remainder of the hot water add the perfuming oil and shake well, then

add the quince seed mucilage and the glycerin, shake well and add the alcohol.

If desired 1 to 2 drams of boric acid may be dissolved in the mixture. Put up in four ounce French square bottles, provided with closely fitting cork, over which tie a paper cork cover with narrow ribbon. Label neatly and sell for twenty-five cents.

Directions for use: Wash the face and hands in warm water and wipe dry. Then apply a little of the lotion, rubbing until dry. These directions apply to all the foregoing formulas.

FRAGRANT LIQUID CREAM.

Tragacanth	2 ounces
Water	1 gallon
Glycerin	8 ounces
Borax	2 ounces
Tincture Benzoin	½ ounce
Alcohol	4 ounces
Distilled Witch Hazel	4 ounces
Oil of Bergamot	30 drops
Oil of Lemon	10 drops
Oil of Neroli	10 drops
Liquid Carmine enough to give the desired pink color	

Put the tragacanth into a gallon bottle and pour over it six pints of the water. Let stand for two or three days with frequent shaking. It will form a smooth heavy mixture.

Dissolve the borax in the remainder of the water by means of heat and pour into the tragacanth mixture. Add the glycerin and shake well. Then add the witch hazel and shake again. Lastly add the alcohol with which the oils and tincture have been mixed and then add the color gradually until the desired tint is obtained.

Put up as directed for the preceeding formula.

WHITE ROSE CREAM.

Macerate 90 grains of quince seed in two pints of rose water for one hour. Strain and add one pint of glycerin, mixing thoroughly. Then add with constant agitation one ounce of tincture of benzoin, strain immediately through muslin, let stand for six hours and strain again. The tincture of benzoin should be added a few drops at a time mixing well after each addition. If properly made the preparation will not separate on standing.

MENTHOL LOTION.

Menthol	10 grains
Powdered Tragacanth	1 dram
Alcohol	1 ounce
Glycerin	½ ounce
Water enough to make	12 ounces

Dissolve the menthol in the alcohol and add to the tragacanth contained in a dry bottle; add the water and shake well, then add the glycerin and shake until a uniform smooth mixture results.

LANOLIN LOTION.

White Castile Soap in powder	90 grains
Lanolin	2 ounces
Borax	2 drams
Water	1 pint

Dissolve the soap and borax in half a pint of water. Mix the lanolin with the remainder of the water (hot) and mix the two solutions, shaking well.

This gives a milk white product which may be perfumed as desired.

TRAGACANTH AND QUINCE SEED LOTION.

Tragacanth	2 drams
Quince Seed	2 ounces
Borax	6 drams

Boric Acid	1 ounce
Glycerin	10 ounces
Alcohol	10 ounces
Sodium Benzoate	3 drams
Water	100 ounces

Mix the tragacanth with one pint of water and let stand until a uniform smooth mixture results. Put the quince seed in a bottle with two pints of boiling water and let stand until cool. Dissolve the borax in one pint of hot water, and the boric acid in the alcohol. Dissolve the benzoate of soda in one pint of water and mix all of these solutions together. Then add the glycerin and water enough to make 124 ounces.

Any desired perfume and color may be added.

This preparation is non-sticky, non-greasy and non-irritating.

MAY DEW COMPLEXION LOTION.

Magnesium Sulphate (Epsom Salts)	1 ounce
Water	1 pint
Tincture Benzoin	½ dram

Dissolve the salts in the water and add the tincture, a drop at a time, with constant shaking. Let stand over night and then strain or filter.

Apply with a soft cloth, after washing the face and drying it thoroughly. In applying, dab on instead of rubbing and when it has become dry go over the face with a soft dry cloth. This preparation possesses marked whitening properties, renders the use of powder unnecessary, and is entirely harmless.

FLAX CREME OR LOTION.

Linseed Mucilage	24 ounces
Boric Acid	2 drams
Salicylic Acid	1 dram
Glycerin	6 ounces

Cologne	12 ounces
Water	12 ounces

Dissolve the boric acid in the cologne and mix with the other ingredients.

The linseed mucilage is prepared as follows:

Warm Water	3 pints
Flaxseed	8 ounces

Pour the water over the seed and allow to stand for six hours with occasional stirring. Then strain through muslin.

Instead of the cologne in the above formula, 12 ounces of 60% alcohol may be used and any desired perfume added. By using rose water instead of plain water as the last ingredient of the formula a more elegant preparation may be produced.

WITCH HAZEL CREAM OR LOTION.

Quince Seed	2 ounces
Hot Water	8 ounces
Glycerin	1 pint
Distilled Witch Hazel	4 pints
Boric Acid	3 ounces
Perfume to suit	

Place the quince seed in a porcelain or enamelled vessel and pour the hot water over them, let stand for half an hour, then add the glycerin and witch hazel in which the boric acid has been dissolved. Allow to stand for two or three days, with occasional stirring, strain through muslin and add the perfume.

FACE POWDERS.

No line of Toilet Specialties is complete without a good Face Powder. Probably no other toilet requisite is in such constant and universal demand, a powder of some kind being a *sine qua non* of "my lady's toilet," regardless whether she is the fortunate possessor of a perfect complexion or belongs to that more common type of feminine humanity

having their full quota of facial defects and blemishes, such as redness and roughness of the skin, pimples, etc.

A first class Face Powder is much more deserving of the title of "beautifier" than the majority of creams, pastes and lotions which masquerade under that name. In addition to its effect in temporarily concealing defects of the complexion, it acts as a protective to the skin and also as an absorbent, thus preventing to a considerable degree chapping and roughness from contact with extremes of temperature, winds, etc. The better grade of powders also exert a medicinal effect, removing certain blemishes, principally through their power of absorption, although these powders into which zinc oxide or the basic salts of bismuth enter as an ingredient have a direct therapeutic action.

Among the materials entering into the composition of the various powders now on the market, may be mentioned, starch, talc, kaolin, zinc oxide, bismuth salts (the basic chloride, nitrate and carbonate), calcium carbonate (chalk), magnesium carbonate, powdered orris root, carbonate of lead, etc. Numerous other ingredients are used chiefly for their medicinal or antispetic effect, such as salicylic and boric acids, and some of the newer preparations make use of zinc stearate which possesses many advantages for the purpose. Use has also been made of several of the so-called oxygen products which have recently appeared on the market, including sodium perborate and zinc and magnesium peroxides. These last mentioned chemicals when they come in contact with the secretions of the skin, liberate free oxygen, thus acting as antiseptics. Just how much therapeutic value they possess, I am not prepared to say, but their presence gives a strong advertising feature, the word oxygen seeming to be synonomous in the minds of a large percentage of the people, with all that is desirable in any preparation.

The quality of materials has much more to do with the quality of the finished product than the exact combination

of these ingredients. Whatever the composition of your product may be, the best materials must be used if the best results are desired or expected. The least suggestion of grittiness is sufficient to spoil a preparation of this kind, no matter how meritorious it may be in other respects and any carelessness in tinting so that the color comes out in streaks on the skin is a most culpable offense against good taste and good judgment and is sure to bring your product into disfavor.

The superior quality of the finest grades of face powders, is not due to the possesion of any secret of composition by their manufacturers but lies in the use of a better grade of materials than commonly enter into the composition of this product. Reference to any drug price list will show you that several grades of most of these products are quoted and, as might be expected, the average pharmacist does not stock up largely with the better grades. Unless you insist on getting the best grades of materials your product is sure to fall considerably below the highest standard of quality.

Contrary to the quite general belief, the so-called rice powders which are quite common under such names as Blanc Vegetal, Poudre du Serail, Poudre de Riz, etc., are not necessarily the most satisfactory or the best for the complexion. Many of these are free from any suspicion of starch, either rice or any other kind, which is an advantage rather than a defect from the standpoint of merit. Starch, whether corn starch, powdered rice or any other kind, will become more or less rancid, get sticky and tend to clog up the pores of the skin. If starch is used at all it should be in combination with some mineral substance like zinc oxide, well washed potato starch being superior to the other kinds for cosmetic purposes.

A simple test for the detection of starch in face powder is to mix a small quantity of the powder with a little potas-

sium iodide and then add a drop of peroxide of hydrogen. The oxygen liberates the iodine from the potassium salt and in case starch is present the iodine will combine with it, giving the characteristic blue color of iodide of starch. This method of testing, which I believe is original with me, is superior to the ordinary iodine test, in that the potassium salt is colorless and the reaction is more easily observed than when free iodine is used. As the iodine is released from the salt gradually, the color of the iodine itself is not prominent enough to obscure even a slight reaction to an entirely unexperienced eye.

It is comparitively easy to detect the composition of most face powders by means of microscopical examination combined with a few simple tests. After a little experience in this work a very indifferent sort of chemist may make a pretty shrewd guess as to what any sample is made of.

Powdered orris root which enters so many formulas for this product, is objectionable owing to the difficulty of reducing it to an impalpable powder. Aside from its imparting a yellowish color, which is sometimes desirable in "brunette" powders, it possesses no advantage over starch except for the odor it gives. Sandalwood, which is sometimes used to give a brown color to "brunette" powders is open to the same objections as orris, and as a rule, the use of burnt umber, burnt sienna or Armenian bole to give the desired shade will be found more satisfactory.

Zinc oxide is a very valuable ingredient, being entirely harmless and possessing mild astringent qualities, it has a beneficial effect upon the skin in most instances. It also gives covering power and adhesiveness to the powder.

The bismuth salts exert the same effect, though in a lower degree than the zinc oxide. The idea that they are injurious is rather far fetched and they may be employed to advantage many times. The chief objection to their use is the matter of cost.

In perfuming face powders, the best method is to use a concentrated liquid perfume and spray it over the powders with an atomizer, mixing well until the desired amount of perfume has been added. Then spread out the powder to dry and finally pass several times through a fine sieve to remove any lumpiness which may have been occasioned by the moistening. In powders containing starch, it is advisable to add the perfume to the remainder of the powder before this ingredient is added, then mix the starch thoroughly with the perfumed powder.

A wide variety of perfumes are available for this purpose, the most desirable being rose, violet and jasmin, or a combination of these odors. Some of the large dealers in perfume materials furnish odors specially adapted to this use.

In tinting powders, always mix the color to be used with a small quantity of the powder, using sufficient of the coloring substance to impart a very deep color. Then use sufficient of this colored powder to give the desired tint to the whole mass. By this method the color will be more evenly distributed than would be possible by mixing the color directly with the entire quantity of powder.

The coloring substance most commonely used is carmine, the variety known as No. 40 carmine being the best grade. By a judicious use of this material a fine "flesh" powder may be obtained and by using carmine combined with a trace of ochre or umber the brunette or "Rachelle" powders are produced. In practice it will generally be found desirable to rub up the coloring matter with a little alcohol in a good sized mortar, then adding the powder a little at a time with constant rubbing. Some advise the use of liquid carmine but this is hardly advisable on account of the trouble occasioned in drying powders where this is used.

"PERFECTE" FACE POWDER.

Stearic Acid	1 dram

Oxide of Zinc	4 ounces
Best Talcum	8 ounces
Carbonate of Magnesia	1 ounce
Alcohol	1 ounce

Dissolve the acid in the alcohol by heating gently. Then rub in with the remainder of the ingredients. Allow to dry. Rub up again and pass through a fine sieve.

Use any desired perfume in quantities to suit.

FLESH.

To the white powder add sufficient carmine No. 40 to give the desired tint. Sometimes a small quantity of chrome yellow is also added. Only a trace of this should be used. The quantity of carmine varies in the different grades of powder on the market, but about four drams to each ten pounds of white powder is the usual quantity used.

BRUNETTE.

To the white powder add carmine No. 40 and sufficient dry burnt umber to give the desired color. Yellow ochre may be substituted for the burnt umber if desired.

It is a difficult matter to state exactly the quantity of coloring matter to be used with a given quantity of the white powder, however, the following formulas will give a general idea of the proportions most commonly used and a greater or less quantity of the color may be added to suit individual tastes.

FLESH.

To each ten pounds of white powder use 250 grains of No. 40 carmine. It is considered advisable by some manufacturers to make use of finely powdered orris root in these tinted powders, the usual proportion being one pound of the orris root to nine pounds of the white powder or base. To this mixture the carmine is added as directed above.

BRUNETTE.

To each ten pounds of white powder use three ounces

of yellow ochre and sixty grains of carmine. If the use of orris root is deemed advisable, one pound of this substance may replace an equal amount of the white powder.

POUDRE DE RIZ.

Corn Starch	7 pounds
Rice Flour	1 pound
Talc	1 pound
Perfume to suit	

Mix the perfume with the talc and incorporate this with the starch and rice flour.

TALCUM POWDERS.

These consist simply of finely powdered talc, combined with an antiseptic, as boric acid, and a suitable perfume. Occasionally a little magnesium carbonate is added, but powders in which this is an ingredient can hardly be termed true talcum powders, and should be classed among toilet powders, which rather elastic term is used to designate various mixtures designed to be used for the purpose of whitening the skin, to prevent or relieve chafing, etc.

In making borated talcum powders, the usual proportions are one pound of boric acid to each twenty-five pounds of talc, the two substances being thoroughly mixed together. Any desired perfume may be added, violet being an especial favorite. Several perfume houses carry what is called "violet for talc," being a medium priced violet odor in a concentrated form. In perfuming this specialty, it is advisable to rub up the perfume with a small quantity of the powder, then combine this with the remainder of the mass. Rose has been used to some extent in perfuming talcum powders but owing to its cost it is only suitable for an especially high grade product for which a fancy price is charged. Oil of rose geranium provides a pleasant odor at a reasonable price. In case a rose odor is desired would suggest the use of the artificial rather than the true oil, on account of the difference in cost.

Talc is usually put up in bags holding about 220 pounds and may be bought at wholesale at from 1½ to 5 cents per pound, according to the quality. The cans or boxes used in putting up this specialty may be obtained from any manufacturer of lithographed boxes. Formerly talcum powders were put up in tin or glass only but there is a growing tendency among manufacturers to use a lithographed paper sifting top box. Several of the largest concerns dealing in lithographed tin boxes carry various styles of "stock" boxes which may be purchased at a very reasonable price.

BATH POWDERS.

These are designed to soften the water used in bathing, make the bath refreshing and impart an agreeable odor to the water. While dozens of different combinations have been devised for this purpose, there is nothing better than pure borax nicely perfumed and put up in attractive packages. Where this is used the directions should instruct the user to add from one to two teaspoonfuls of the powder to a tub of water. Any desired perfume may be used and the instructions given regarding the perfuming of face powders will apply to the preparation of this product.

Some of the formulas often recommended for this specialty follow:

EFFERVESCENT BATH POWDER.

Tartaric Acid	10 ounces
Sodium Bicarbonate	9 ounces
Starch	6 ounces

Mix thoroughly. It may be perfumed with oil of lavender, flowers, or a mixture of this oil with oil of rose geranium. When added to water the alkali and acid with a copious liberation of carbonic acid gas.

BATH POWDER.

Borax	4 pounds
Ammonium Chloride	1 ounce

Reduce to a fine powder and mix thoroughly.

To perfume sprinkle over the mixed powders from ½ ounce to one ounce of the following:

Oil Rose Geranium	1 dram
Oil Neroli	10 drops
Tincture Orris	2 ounces
Oil Rose Geranium	10 drops
Alcohol	4 ounces

Then mix well, dry and pass through a fine sieve. Put up in boxes similar to those used for talcum powder.

BATH POWDER NO. 2.

Sodium Bicarbonate	4 ounces
Borax	4 ounces
Potassium Bicarbonate	1 dram
Ammonium Chloride	1 dram
Oil of Lavender Flowers	15 drops
Oil of Neroli	10 drops
Oil of Rosemary	15 drops
Oil of Bergamot	15 drops
Oil of Sweet Orange	15 drops

Mix the powders and sprinkle the oils over them, then mix again.

FOOT POWDERS.

During the past few years preparations of this kind have become very popular under such names as "Foot Ease," "Easy Foot," "Foot Rest," etc. They are cheap and easy to produce and meet with a ready sale in most sections of the country. They consist largely of talc combined with antiseptics as boric and salicylic acids. One or two firms have attempted to market a powder containing potassium permanganate as an ingredient but while this is a most excellent deodorizer and antiseptic, the fact that it stains the skin when it comes in contact with the perspiration has proved an effective barrier against such powders meeting with popular approval.

These powders are put up in various ways, one of the most attractive being in sifting top, lithographed tin cans. Stock designs in these cans may be had at a reasonable price if you do not care to go to the expense of getting up a special lithographed container.

I.

Salicylic Acid	½ ounce
Boric Acid	1 ounce
Zinc Oxide	1 ounce
Talc	5½ ounces

The addition of sufficient perfume of any desired kind to give the powder a nice odor is an improvement. This may be something in the nature of a flower odor as neroli, or an antiseptic substance like oil of eucalpytus. In perfuming follow the directions for perfuming other powder specialties.

II.

Zinc Oleate	1 ounce
Boric Acid	2 ounces
Talc	8 ounces

III.

Salicylic Acid	7 drams
Boric Acid	3 ounces
Talc	38 ounces
Powdered Slippery Elm Bark	1 ounce
Powdered Orris Root	1 ounce

IV.

Talc	12 ounces
Boric Acid	10 ounces
Salicylic Acid	1 ounce
Oil of Eucalyptus	2 drams

V.

Sulphur	2 ounces
Boric Acid	4 ounces
Talcum	6 ounces

Sprinkle freely in the shoes and stockings.

The composition of some of the best known proprietary Foot Powders on the market as shown by analyses made by a prominent chemist may prove of interest. Each number represents a particular sample of powder.

No. 1. Talcum 75 per cent., boric acid 25 per cent.

No. 2. Talcum 12.5 per cent., starch 50 per cent., borax 37.5 per cent.

No. 3. Talcum 25 per cent., boric acid 75 per cent.

No. 4. Talcum 65 per cent., alum 20 per cent., magnesia 15 per cent.

No. 5. Talcum 90 per cent., borax 10 per cent.

No. 6. Talcum 95 per cent., alum 4 per cent., boric acid 1 per cent.

No. 7. Starch 65 per cent., zinc oxide 35 per cent.

No. 8. Talcum 60 per cent., boric acid 40 per cent.

No. 9. Talcum 75 per cent., starch 15 per cent., salicylic acid 7.5 per cent., alum 2.5 per cent.

No. 10. Zinc oxide 25 per cent., borax 75 per cent.

No. 11. Starch 75 per cent., salicylic acid 25 per cent.

All the most important brands were found to contain talcum in the proportion of 75 to 90 per cent. The starch is mostly in the form of corn, wheat or potato starch, only one sample containing powdered orris root. Salicylic acid is used in the proportion of 3 to 7.5 per cent., as a rule, and boric acid varied from 1 to 75 per cent.

EXCESSIVE PERSPIRATION POWDERS.

These are designed to overcome the odor produced by perspiration, particularly in the armpits. Most of the proprietary preparations are mixtures of some absorbent powder as magnesium carbonate with various antiseptics. Here are some typical formulas:

I.

Oxide of Zinc	1 ounce
Boric Acid	2 ounces

Analyses from Druggist's Circular.

Carbonate of Magnesia	8 ounces
Salicylic Acid	10 grains

Reduce to the finest possible powder and mix well by sieving.

A small quantity of some delicate perfume may be added if desired. Rose or violet are best adapted to such products, although such odors as heliotrope or trefle will also be found satisfactory.

II.

Salicylic Acid	1 dram
Powdered Burnt Alum	2 drams
Boric Acid	2 ounces
Talc	10 ounces

Have all in the finest possible powder and mix well by sieving.

The suggestions given for perfuming No. 1 apply also to this powder.

III.

Magnesium Carbonate	1 pound
Bi-carbonate of Soda	1 ounce
Boric Acid	1 ounce
Talc	1 pound

Mix as directed for the preceding formulas.

IV.

Salicylic Acid	1 dram
Boric Acid	3 ounces
Talc	1¾ pounds

Mix as directed for the preceding formulas.

DENTAL SPECIALTIES.

These include such preparations as tooth powders, pastes, etc., remedies for toothache, mouth washes and a considerable variety of other preparations designed to pre-

serve the teeth and improve their appearance. These specialties meet with a ready sale at all times and offer great possibilities to the manufacturer who will cater to the public taste in such preparations. The chief essential to success with this line is the production of a high grade article combined with advertising methods which will bring your products to the favorable attention of the public.

TOOTH POWDERS.

The principal features to be aimed at in the production of this specialty is to provide a powder which will be attractive in taste and appearance, and which will effectually clean the teeth without injuring the enamel. There is a great similarity among proprietary tooth powders, the distinguishing features of the various brands residing in slight modifications in color and flavor rather than any difference in composition.

The polishing material most often used is precipitated chalk, and it is doubtful if a better one could be found. Some formulas call for the use of powdered pumice, sepia (cuttle fish bone), etc., but these substances are of questionable value on account of their harsh abrasive action. Formerly powders containing charcoal were quite popular, but these are now seldom found in the market. The dark color imparted to the mixture by this ingredient is unpleasing and although it has some value as an absorbent and deodorizer I hardly consider these of importance enough to offset its disadvantages.

The formulas given below are typical and by varying the proportions of the different ingredients and making slight changes in flavor, you will be enabled to duplicate almost any powder on the market in appearance and action.

I.

Prepared Chalk	7 ounces
White Powdered Sugar	1½ ounces

Powdered Orris Root	2	ounces
Powdered Cuttle Fish Bone	1	ounce
Powdered Chlorate of Potash	½	ounce
Powdered Pumice Stone	½	ounce
Powdered Castile Soap	½	ounce

Mix all together by sifting several times, perfuming with 5 drops oil of peppermint and 1 drop of oil of rose geranium. Any other perfuming oils may be used, such as oil of wintergreen or cinnamon, in quantities to suit.

This formula was devised by one of the Professors of Dental Surgery in a prominent university after several years of experiment. The inventor claims that it will overcome any complications that may arise in the mouth pertaining to keeping the gums and teeth in proper condition, and that from a therapeutic standpoint it cannot be excelled. Personally I should advise substituting infusorial earth for the powdered pumice.

II.

Powdered Precipitated Chalk	4	pounds
Powdered Sepia	4½	ounces
Powdered Castile Soap	18	ounces
Powdered Orris	9	ounces
Saccharin	60	grains
Oil of Wintergreen	3	ounces

Mix well and run through a fine sieve.

III.

Infusorial Earth	8	ounces
Powdered Orris	1½	ounces
Powdered Soap	½	ounce
Phenol (crystals)	30	grains
Camphor	30	grains
Oil of Rose	10	minims
Solution of Carmine	Enough	

Rub the phenol with the camphor until liquefaction is

complete, and gradually add, with thorough rubbing, 2 ounces of the infusorial earth. Rub the oil and color with the rest of the infusorial earth. Finally mix all the powders and pass them through a fine sieve or bolting cloth.

IV.

Precipitated Chalk	8 ounces
Powdered Orris Root	4 ounces
Carmine No. 40	2 drams
Oil of Red Cedar Wood	1 dram
Oil of Peppermint	30 minims
Oil of Spearmint	15 minims
Oil of Cloves	5 minims

Rub the carmine with a small portion of the chalk until the two are thoroughly mixed; then rub with the remainder of the chalk and the orris, adding the oils previously mixed.

Care must be taken not to confound the oil of red cedar wood with the ordinary oil of cedar, which is from an entirely different source.

V.

Powdered White Castile Soap	2 ounces
Precipitated Chalk	14 ounces
Saccharin	24 grains
Oil of Wintergreen	10 drops

VI.

Precipitated Chalk	3 pounds
Powdered Myrrh	4 ounces
Powdered Sugar	1 pound
White Castile Soap	8 ounces
Oil of Wintergreen	Sufficient

TOOTH PASTES.

The chief requisites of a specialty of this kind is that it shall be pleasant to use, effective in action and possess keeping qualities in the highest degree. To these ends it must be pleasantly flavored and colored, it must employ anti-

septic germicidal properties combined with sufficient abrasive power to remove stains and discolorations from the teeth without doing injury to the enamel, and it must be so made as not to harden or dry out in the tubes from keeping.

In order to produce such a preparation we must first have a "mass solution" or "base" which will keep the paste of such consistence that it may be easily squeezed from the tubes. After much experiment I have selected the following as conforming in the highest degree to these conditions:

Gelatin in small pieces	7½	drams
Castile Soap	15	drams
Water	32	fluid ounces
Saccharin	2	drams
Menthol	2	drams
Oil of Eucalyptus	2	fluid drams
Oil of Wintergreen or Cassia	5½	fluid drams
Glycerin	32	fluid ounces

Soak the gelatin over night in 16 ounces of water (cold), dissolve the soap and saccharin in the remainder of the water (hot). In the morning mix the two solutions and add the glycerin which has previously been combined with the menthol, eucalyptus and wintergreen. Mix to a smooth paste.

This should be allowed to stand from 24 to 48 hours after mixing before it is combined with the powder portion of the formula.

As a powder to act as the cleansing or abrasive agent, nothing is better than a fine grade of precipitated chalk. This is the basis of the best tooth powders on the market and combines cleansing properties with low price to an admirable degree.

To make the paste take equal parts by weight of the mass solution and the precipitated chalk. Mix thoroughly and put up at once in tubes. This is very soft when first

made and will readily enter the tubes without the use of a machine for filling. After a few days, however, the calcium of the chalk, and the gelatin react in such a way as to form a firm but not too stiff paste which will remain of this consistence indefinitely.

By increasing the quantity of chalk a product is obtained which may be sold in tin boxes, but such a plan of putting up is not recommended. However, if you desire to market it in this form you will use:

Mass Solution	3½ pounds
Precipitated Chalk	5 pounds

Pack in boxes as soon as made, and store in a cool place until the paste has "set up" before selling.

In using, a small quantity of the paste is squeezed from the tube on a tooth brush which has been moistened in water, warm or cold, according to the desire of the user. This is then used the same as any other paste or powder, finishing by removing all traces of the paste by means of a brush and clean water.

If put up in boxes, the brush may first be moistened and then rubbed directly upon the paste. Then use as above directed.

TOOTH WASHES.

As they appear on the market at the present time, these specialties are for the most part, solutions of soap in dilute alcohol combined with glycerin, antiseptics and sufficient essential oils to impart an aromatic taste and odor to the product. Quite recently several non-soapy antiseptic mouth washes have been placed before the public, consisting of a weak solution of formaldehyde combined with flavoring materials. On account of the tendency of formaldehyde to break up essential oils into their component parts, thus resulting in the production of a tepene-like flavor, some care must be exercised in selecting a favorable material for any

specialty in which this forms an ingredient. My experiments along this line have led to the conclusion that amyl acetate is one of the most staple and least objectionable flavoring materials which can be used in such combinations. A typical formula for this class of specialties is as follows:

Alcohol	4 ounces
Water	12 ounces
Formalin (40%)	15 drops
Ammonia	10 drops
Camphor	5 grains
Menthol	5 grains
Amyl Acetate	5 drops

Dissolve the camphor and menthol in the alcohol, add the amyl acetate, then the water and lastly the ammonia. Filter clear. Enough glycerin may be used to impart a pleasant sweet taste to the product if desired, replacing an equal quantity of water, or this may be omitted and the desired sweet taste obtained by means of a little saccharin.

PEROXIDE MOUTH WASH.

Thymol	½ dram
Menthol	½ dram
Alcohol	50 drams
Tinct. Krameria	30 drams
Hydrogen Peroxide (12%)	15 ounces

A few drops to be used with a tumblerful of water.

THYMOL MOUTH WASH.

Thymol	1½ drams
Oil Peppermint	2½ drams
Tincture Myrrh	3 drams
Oil Eucalyptus	36 grains
Alcohol	25 ounces
Water, Distilled	5 ounces

Mix all except the water, then add this gradually with constant shaking.

The following formulas will give a high grade saponaceous tooth wash:

I.

White Castile Soap	270 grains
Glycerin	4½ fluidrams
Simple Syrup	2 fluidounces
Water	13 fluidounces
Alcohol	13 fluidounces
Tincture of Cardamon	2 fluidrams
Tincture of Canada Snakeroot, (1 in 16)	2 fluidrams
Oil of Peppermint	25 minims
Oil of Wintergreen	25 minims
Oil of Clove	6 minims
Oil of Cassia	6 minims

Solution of Carmine, sufficient to color.

Mix the soap, glycerine, syrup and water; stir well, add the alcohol, then the remainder of the ingredients, and let the mixture stand for a few days. Filter the preparation at a low temperature to prevent the soap from separating.

II.

Green Soap	9 drams
Glycerin	9 drams
Syrup, U. S. P.	4 ounces
Soft Water	26 ounces
Alcohol	26 ounces
Rose Water	1 ounce
Oil of Peppermint	45 minims
Oil of Wintergreen	1 dram
Oil of Cloves	20 minims
Oil of Cassia	15 minims
Solution of Carmine	2 drams

Dissolve the soap in hot water and add the syrup, glycerine and rose water. Dissolve the oils in the alcohol, and mix

the solution with the former one. Add the solution of carmine and filter the preparation at a very low temperature.

III.

Powdered Soap Bark	3 ounces
Alcohol	5 ounces
Glycerin	3 ounces
Water	20 ounces
Oil of Wintergreen	20 drops
Oil of Cinnamon	5 drops

Dissolve the oils in one ounce of alcohol. Macerate the soap bark, glycerine and the remainder of the alcohol together for three days. Add the water and the dissolved oils, let stand for two days, shaking occasionally. Filter through paper.

It may be given a bright red color by the addition of cochineal extract made by digesting cochineal in equal parts of alcohol and water until the color is extracted. Strain through muslin and use sufficient to give the desired color.

By the substitution of powdered castile soap for the soap bark the process of manufacturing may be shortened, but the article produced is not as good as when the soap bark is used.

IV.

Menthol	½ dram
Oil Eucalyptus	½ dram
Oil Wintergreen or Cassia	1 dram
Saccharine	1 dram
Liq. Potassa, U. S. P.	2 ounces
Alcohol	15 ounces
Borax	1 ounce
Water enough to make	62½ ounces

Dissolve menthol and oils in alcohol. Dissolve borax in water with the liquid potassa and saccharin. Color with compound tincture of cudbear or liquid carmine, if desired and filter clear.

TOOTHACHE REMEDIES.

See this subject in Medical Section.

HAIR DYES AND STAINS.

In ancient times people grew old as they do now and the frosts of age blanched the raven locks of youth the same as at the present day. In those days, as at the present, there were also those with hair glowing with red or some other tint not deemed desirable to its possessor.

Then, as now, the people desired something to conceal or erase the marks left by the hand of time or render the hair of a shade more in keeping with its possessor's ideas of the good and beautiful than nature had seen fit to provide.

Hence it was that hair dyes came into use and the demand for substances capable of changing the color of the hair, which originated some thirty centuries or more ago, is still as brisk as ever.

The substances employed for for this purpose before the science of Chemistry came to be understood were generally quite ineffective, being for the most part fugitive vegetable stains which water would easily remove. There was, however, in existence in ancient Egypt, if the statements of various writers are to be believed, a metallic mixture which served as a most effective dye for the hair and, according to the statements of these writers, appears to have been superior to anything known to modern chemists. Travelers who have visited the Armenian convents in Turkey often speak of the fine black beards of the monks, even those of advanced age. These persons use a dye which appears to be similar to the Egyptian mixture referred to above and one writer, Landerer, has described in detail the methods of preparing this compound. I quote verbatim from his writings:

"Finely pulverized galls are kneaded with a little oil to a paste, which is roasted in an iron pan until the oil vapors

cease to evolve, upon which the residue is triturated with water into a paste and heated again to dryness. At the same time a metallic mixture, which is brought from Egypt to the commercial marts of the East, and which is termed in Turkish Rastiko-petro, or Rastik-Yuzim, is employed for this purpose. This metal, which looks like dross, is by some Armenians intentionally fused, and consists of iron and copper. It obtains its name from its use for the coloration of the hair and particularly the eyebrows—for rastik means eyebrows, and yuzi stone. The fine powder of this metal is as intimately mixed as possible with the moistened gall-mass into a paste, which is preserved in a damp place, by which it acquires the blackening property. In some cases this mass is mixed with the powder of odorous substances which are used in the seraglio as perfumes and called harsi, that is, pleasant odor; and of these the principal ingredient is ambergris. To blacken the hair a little of the dye is triturated in the hand between the fingers, with which the hair or beard is well rubbed. After a few days the hair becomes very beautifully black, and it is a real pleasure to see such fine black beards as are met with in the East among the Turks who use this black dye. Another and important advantage in the use of this black dye consists therein, that the hair remains soft, pliant and for a long time black, when it has been once dyed with this substance. That the coloring properties of this dye are to be chiefly ascribed to the pyrogallic acid, which can be found by treating the mass with water, may be with certainty assured."

Another substance which was popular among the ancient nations as a hair dye was obtained from the leaves of a plant called Henna and this method of coloring the hair is still practiced among some Eastern nations. The method of using this is to infuse the leaves in warm water, letting them stand for two or three days, then boil and strain. The extract thus obtained is boiled down to one-tenth its original

volume and applied to the hair, whcih has previously been freed from all grease by shampooing thoroughly. Sometimes a substance known as "reng," being a species of the indigo plant, is used in combination with the henna. Care must be used in applying not to allow the mixture to touch the skin, as it stains it. Some attempts have been made in recent years to introduce this kind of dye into this country, but untoward results from its use, such as turning the hair green are occasionally obtained, where the *modus operandi* of applying has not been properly conducted, it is doubtful if its use will ever become popular. When the operation of dying with this substance is successful it imparts to the hair the fashionable reddish, auburn color.

It is self evident that the dying of living hair is an entirely different proposition from the coloring of silk, wool and similar substances, and that the caustic and corrosive materials often used for the latter purpose would be entirely unsuited for any preparation to be applied to the hair. We are limited, therefore, in producing this class of preparations to such substances as will not seriously affect the texture of the hair to which it is applied, nor injure the scalp, should they happen to come in contact with it. It is probable that any dye exerts a more or less harmful influence upon the hair, even those composed of vegetable and non-poisonous ingredients, requiring the removal of the natural oil of the hair by thorough washing before the dye is applied, which if frequently repeated will render the hair harsh and brittle. However, much of the "scare talk" of the newspapers regarding the great dangers of using anything in the way of hair dye, has no foundation in fact. While in extremely susceptible subjects, enough of the mineral salts used in preparing such products might be taken into the system through absorption to produce symptoms of poisoning, such cases are extremely rare.

A universally satisfactory hair dye has never been discovered and it is doubtful if such a one ever will be. While there are a considerable number of preparations on the market which give satisfaction in the majority of instances, human hair varies so much in quality and texture that unexpected results and trouble will occasionally occur, even with the best preparations. A perfect dye, if such were possible, would have to work equally well on all qualities of hair, containing nothing in any way injurious to hair or scalp, give exactly the same shade desired instead of coloring all hair black, as do most of the dyes now sold, must not stain the skin and should be proof against the action of soap and water. It must also be simple and easy to use and keep indefinitely without losing its effectiveness.

To produce a hair dye which will compare favorably with the best of those now on the market is not so difficult a matter and the formulas given herewith will be found capable of accomplishing this work.

Most of the dyes now sold contain salts of silver, lead, copper or bismuth, and some other substance which will bring out the color. In preparations containing lead, either sulphur or one of the sulphides is generally used, the action of these being to convert the lead into black lead-sulphide upon exposure to the atmosphere. This class of dyes (the lead-sulphur combinations), were brought into notice soon after the close of the Mexican War, the first one to attract any amount of attention being known as General Twigg's Hair Dye, taking its name from an officer of that name whom it was claimed had used it with marked success. Various formulas for these dyes have been published from time to time, but the following I have found most satisfactory:

Precipitated Sulphur	1 dram
Acetate of Lead	½ dram
Bay Rum	1 dram

Glycerin	1 dram
Aqua Ammonia	½ dram
Comon Salt	½ dram
Rose Water	8 ounces

Rub up the sulphur with the glycerin, dissolve the lead in the bay rum and the salt in the rose water, mix and add the ammonia.

Use three times a day for the first week, then twice a day until the desired color is obtained, then as needed. Keep in dark colored bottle. Avoid washing the hair. In using, pour a little into the hand and rub into the scalp.

This produces the change in color gradually. Usually about two weeks are required to get effects.

The sulphur, being insoluble will form a deposit in the bottom of the bottle, and the label should instruct the purchaser to "shake before using."

This deposit of sulphur, being considered objectionable by some persons, chemists sought to produce a preparation which would have the same effect without this objectionable feature. As a result of such attempts the following formula was evolved, which will be found to give an elegant and very effective product:

Hyposulphite Soda	4 drams
Distilled Water	4 ounces
Dissolve.	
Acetate Lead	1 dram
Distilled Water	4 ounces
Dissolve, mix, filter and add	
Glycerin	4 drams
Then add	
Distilled Water	to 8 ounces

To be applied to the roots of the hair with a brush, or with the hand, as directed for the first formula.

Several manufacturers are offering what they term

"Hair Color Restoratives," which produce their effect gradually and are guaranteed to contain no lead or sulphur. This claim is made the chief feature of their advertising and they depict in glowing language the awful effects which are likely to result from the use of dyes into which lead enters as an ingredient. These "restoratives" are made in several different numbers, according to the shade which they are intended to produce. All of these numbers are essentially the same in composition, the only difference being in the degree of dilution.

Analysis of one of these preparations gave the following:

Nitrate of Silver	420 grains
Sulphate of Copper	120 grains
Stronger Ammonia	q. s.
Water sufficient to make the mixture measure	1 pint

Dissolve the silver and copper salts into eight ounces of the water and add ammonia until a clear solution is formed. Then add sufficient water to bring the finished product up to one pint.

For light shades of brown the solution should be applied once a day, and for darker shades, twice a day until the desired color is produced. Then use occasionally to keep the color as desired. If a black dye is wanted, the quantity of nitrate of silver may be increased to one ounce or even one and one-fourth ounces. For the lighter shades it is desirable to dilute the dye with its own weight of water.

This preparation should be put up in amber or blue glass bottles, as should all preparations of any nature in which nitrate of silver is an ingredient, as the action of light tends to reduce this salt to a black compound and destroy its action.

TWO PREPARATION INSTANTANEOUS BLACK DYE, SUITABLE FOR BARBERS' USE.

This is similar to the dye used by barbers. It is composed of a mordant and a dye as follows:

No. 1. Mordant.

Pyrogallic Acid	3 drachms
Alcohol	5 fluidounces
Water	11 fluidounces

Mix and dissolve.

No. 2. Black Dye.

Nitrate of Silver (crystals)	2 ounces av.
Aqua Ammonia, q. s. or about	4 fluidounces
Distilled Water, q. s. or about	12 fluidounces

Dissolve the nitrate of silver in eight fluid ounces of the distilled water and add three ounces of the aqua ammonia. This will produce a dark brown precipitate. Continue to add aqua ammonia in small quantities until the precipitate is entirely re-dissolved, then add enough distilled water to make a pint.

In making this preparation for black dye no more aqua ammonia must be used than is necessary to dissolve the precipitate, for a larger quantity than is necessary lightens the color.

TWO PREPARATION BROWN DYE.

Silver Nitrate	1 ounce av.
Ammonia Water, q. s. or about	2 fluidounces
Sodium Carbonate, (Sal Soda)	3 drachms
Water, q. s. or about	10 fluidounces

Dissolve the silver nitrate in 8 ounces of water and add ammonia water until the precipitate which is formed is dissolved; dissolve the sal soda in the solution, and add enough water to make 12 fluid ounces, and, after standing a few days, decant.

Use the same mordant for this dye as for the black.

To apply these dyes the hair or whiskers are first washed with soda water or soap suds to remove any grease or oil, the mordant is then applied and allowed to dry; the dye is then put on carefully with a tooth brush or other convenient instrument and dried by fanning; the hair, when dry, is then washed with soap suds, to remove any superfluous dye, and dried.

Stains on the skin may be removed by rubbing them with the following solution:

Potassium Sulphate	1 ounce
Water	1 pint

Dissolve.

WALNUT HAIR STAIN.

Walnut Shells, green	3½ ounces
Water	36 ounces
Resorcin	3 drams
Glycerin	6 ounces

Boil the green walnut shells in the water and strain through muslin. Dissolve the resorcin in the mixture while still warm, add the glycerin and sufficient water to make up for that lost by evaporation, i. e., enough to make the finished product measure 36 ounces.

BISMUTH HAIR DYE (Nacquet's).

Bismuth Citrate	1 ounce
Ammonia	q. s.
Sodium Hyposulphite	½ ounce
Alcohol	3 ounces
Glycerin	½ ounce
Water enough to make	16 ounces

Rub the Bismuth with some of the water (luke warm) into a thin paste; add enough ammonia to make a solution in which to dissolve the soda. Filter, then add the rest, and water enough to make the measure up to 16 ounces.

The alcohol may be dispensed with if desirable. Its addition is to act as a preservative only. Apply with a sponge or brush.

The hair or beard when saturated with this mixture, after five or six hours acquires a deep chestnut color, after washing the hair the color becomes flaxen. Repeat daily until the deep chestnut becomes permanent .

BISMUTH HAIR DYE, NO. 2.

Bismuth Nitrate	460 grains
Tartaric Acid	150 grains
Water	200 minims

Dissolve the tartaric in the water and add the bismuth, stirring until dissolved. Then add one pint of water. This will precipitate the bismuth in the form of a fine white powder. Filter the mixture and pass clear water through the filter until all traces of the acid have been removed. Then dissolve the powder remaining on the filter paper in one-half fluid ounce of ammonia water and add to this solution the following:

Glycerin	40 minims
Hyposulphite of Soda	150 grains
Water enough to make	8 fluidounces

Previously mixed.

Apply as directed for the preceeding bismuth dye. This imparts a deep chestnut color to either hair or beard.

BLACK HAIR DYE WITHOUT LEAD OR SILVER.

I.

Pyrogallic Acid	2 drams
Gallic Acid	2 drams
Cologne Water	2 ounces
Distilled Water	4 ounces

Dissolve the acids in the water and add the cologne.

II.

No. 1.

Ferrous Sulphate	10 grains
Glycerin	1 ounce
Water	1 pint

Dissolve the iron salt in the water and add the glycerine.

No. 2.

Gallic Acid	4 grains
Tannic Acid	4 grains
Water	1½ ounces

Mix and dissolve.

Wash the hair thoroughly with No. 1, dry and apply No. 2 with a fine tooth comb. Care must be taken that the preparation does not touch the skin, as it will produce a black stain.

This dye is not as satisfactory as the lead or silver preparations but if carefully applied will give good results.

CHEAP HAIR DYE.

Copper Chloride	36½ drams
Distilled Water	11 ounces
Ammonia Water	5 ounces

Mix and add gradually, with constant stirring, the following:

Pyrogallic Acid	50 drams
Hydrochloric Acid	22½ ounces
Distilled Water	32 ounces

Which have been Previously mixed together. Then add

Ammonia	6½ ounces

Followed by

Peroxide of Hydrogen	16 ounces

Make up to one gallon with distilled water, place in wide mouth jar and expose to the air for two weeks, stiring occasionally.

Apply with brush or comb, repeating until the desired shade is obtained.

POWDER HAIR DYES.

For mail order purposes, a hair dye in powder form is sometimes desired. While these are not as effective as the liquid dyes, they give fairly good satisfaction and as they can be very cheaply produced, pay a large percentage of profit.

Most of the powder dyes consist simply of Pyrogallic Acid. This is put up in two dram packages, with directions to dissolve the contents of the package in 1½ ounces of hot distilled, or soft water, and when cold add one-half ounce of alcohol. This is for the black dye. For a light chestnut use one dram of the pyrogallic acid to the same quantity of water and alcohol and the intermediate shades are obtained by variations between one and two drams of the powder.

Wash the hair well before using the dye, using a little soap or preferably ammonia to remove all grease and oil, rinsing in clear warm water. If it is desired to color the hair black apply the dye while the hair is still wet. If a brown shade is wanted do not apply until the hair becomes dry. Apply with a fine comb or small brush. When the dye has taken perceptible effect allow the hair to dry.

Washing the hair with a weak solution of ammonia seems to aid in the development of the color. It is usually necessary to apply several times before the desired shade is obtained.

In my own experience, I have found the addition of two to four grains of nitrate of silver, in fine powder to each two drams of the pyrogallic acid, produces a dye which will give better satisfaction, as its effects are more easily apparent on first applying.

The tendency of resorcin to darken when mixed with alkalies in solution leads me to believe that it might be possible to produce a satisfactory powder hair dye by combining this powder with borax or some other alkaline ingred-

ient. While I have never had the opportunity of testing this thoroughly, would suggest that if you wish to experiment along this line that you make a combination similar to the following:

Pyrogallic Acid	1 ounce
Resorcin	1 dram
Borax	½ dram

Mix well.

To use, mix as directed for the pyrogallic dye and apply in the same manner.

BLONDINE OR BLEACHING COMPOUND FOR THE HAIR.

Hydrogen peroxide is the only effective agent which can be used in bleaching living hair. In using this, the hair is first washed with a weak solution of soda to remove the grease and oil, then dried and the peroxide applied and dried by means of a current of hot air or a warm flat iron. Several applications are generally necesary to completely bleach the hair and it requires careful application to bleach it evenly. The yellow tints are produced by simply carrying the process to the point necessary to give the desired color. If the hair is wanted white more of the peroxide will be be required than for the yellow tints.

Some recommend the addition of a small quantity of ammonia to the peroxide at the time of using, claiming that this hastens its action. Personally, I should prefer to apply the ammonia to the hair, following it by the peroxide instead of mixing the two.

There is no question but that the use of any bleaching agent injures the hair, rendering it dry and brittle, and in some instances retarding its growth. The process should never be attempted by an inexperienced operator, as the skill necessary to a successful operation can only be acquired by practice.

HAIR TONICS.

The production of this class of specialties has provided a fertile field for mixers, amateur and otherwise, to display their ability and the result has been to flood the market with hair tonics, good, bad and indifferent.

No tonic has ever been discovered which will cure all cases of baldness and it is safe to say that such a preparation never will be devised, as where the hair roots are once dead nothing will restore them to life, but in cases where they are simply dormant from lack of nutrition or from dandruff or other affections of the scalp, these tonic may restore them to their normal activity and by removing the cause of the trouble restores the hair to its former luxuriance and vigor.

Hair tonics and dandruff cures as now on the market may be divided into three classes, viz:

(1.) Mixtures of sulphur and glycerin, with or without lead acetate, depending upon whether the preparation is to act as a color restorer as well as a tonic. The glycerin serves mainly as a vehicle for the sulphur, although it exerts a considerable effect in the way of softening the hair and rendering it glossy, the sulphur acts as a germicide and in cases where lead is used combines with it gradually forming black lead sulphide. In practically all these tonics the glycerin is diluted with water or alcohol in order to overcome the sticky effect produced when the ingredient is used in too large proportions.

(2.) More or less dilute alcoholic solutions sometimes containing glycerin and borax and generally containing essential oils and some form of rubifacient or counter irritant, such as ammonia, cantharides or tincture of capsicum. These ingredients are used for the purpose of stimulating the scalp, producing an increased circulation of blood by virtue of their irritating action. The essential oils exert an antiseptic action, the oils of lavender and rosemary being

considered of special value in treatment of the scalp. Where glycerin and borax are used in the same solution, they may combine to form boroglycerin, a powerful but harmless antiseptic.

Resorcin, boric acid, salicyclic acid, beta napthol, thymol, menthol, etc., also enter into some of these tonics and serve to increase their antiseptic effect. It must be remembered that resorcin cannot be used in tonics containing an alkaline substance, such as borax or ammonia, on acocunt of the tendency of this substance to darken when combined with alkalies.

(3.) This class is the most expensive of the proprietary tonics and combines the constituents of Class Two with the alkaloids of cinchona, nux vomica, jaborandi, etc. These products are claimed to exert a stimulating influence on the hair roots, but it is quite probable that their value has been greatly overestimated.

The last mentioned ingredient, jarborandi, and its alkaloid pilocarpine is reputed to have a tendency to change the color of the hair when applied to it, and it is still further asserted by some persons that it produces a similar effect when taken internally. While this seems to be rather a far fetched claim it seems to be not entirely without foundation. Shoemaker, in his "Therapeutics and Materia Medica" says that pilocarpus (jaborandi) has a tendency to darken the hair and a prominent physician of my acquaintance states that this substance, taken internally, seems to supply, replace or reproduce the pigment of the hair, eyes and skin. Fluid extract of jaborandi forms the sole constituent of a highly advertised Internal Hair Color Restorer and in at least one case which came under my personal observation it appeared to produce the desired effect. Another chemical to which similar effects are attributed is calcium lactophosphate. However, the public are rather skeptical in re-

gard to any internal remedy affecting in any way the color of the hair and it would seem almost to be flying in the face of fate to attempt to market such a preparation. Notwithstanding this several parties have made considerable money in advertising such preparations, and carrying the idea still further, a very prominent pharmaceutical concern in England are offering what they term Hair Growing Capsules, intended to be taken internally. These are simply the ordinary gelatin capsules filled with haemoglobin, the red coloring principle of blood.

Under the head of cinchona alkaloids comes quinine which has won an enviable reputation as a hair grower. There are numerous Quinine Hair Tonics on the market, some of which contain not a particle of quinine and others into which this substance enters as an ingredient. Under the existing Food and Drug legislation, it would be a violation of the law to label a product as a quinine tonic unless quinine enters into its composition in appreciable quantities. Regardless of what its real effect may be, the public are fond of Quinine Tonics, and there is no question but that this title would add to the selling powers of a preparation of this kind.

In the Sanitary Bulletin of the New Hampshire State Board of Health for April, 1907, appears reports of analyses of thirteen prominent hair tonics and dandruff cures, made by chemists connected with this board. The following extracts from this report may prove of interest as showing what some of the most popular proprietary preparations are made of. These preparations were examined with a view of determining the general character and the presence of harmful or objectionable constituents and the analyses are not offered as complete.

Hay's Hair Health contains lead acetate, sulphur and glycerin.

Parker's Hair Balsam contains lead acetate, sulphur and glycerin.

Hall's Vegetable Sicilian Hair Renewer. The analysis shows glycerin and sulphur. Tests for alcohol, heavy metals, skin irritants, borax, etc., resulted negatively. This sample does not appear to represent the old formula, neither is it the new, now advertised as put up in a different style package and said to include glycerin, boroglycerin, capsicum, bay rum, sulphur, tea, rosemary, alcohol and perfume.

Ayer's Hair Vigor. New formula claims sulphur, glycerin, quinine, sodium chloride, cantharides, sage, alcohol, and perfume. All of these constituents were identified and a test for wood alcohol resulted negatively.

Coke's Dandruff Cure. The analysis shows cantharides and 30.4% alcohol. The total solids amounted to 0.61%.

Zepp's Dandruff Cure. The analysis shows 2% of solids, largely glycerin, and contains cantharides, a small amount of borax and 46.4% of ethyl alcohol.

Corollas Hair Tonic. Contains Borax. Total solids, 0.73%. Alcohol 19.7%, Wood Alcohol absent. Contains a vesicant, not identified.

Westphal's Auxiliator. Shows 3.56% of residue on evaporation, largely glyecrin with borax or boric acid. No alkaloids or vesicants were detected. The analysis shows 54.8% of alcohol.

Seven Sutherland Sisters' Hair Grower. Shows 0.94% of residue on evaporation. 28.4% alcohol. Contains quinine and a small amount of borax. No vesicating substance was detected.

Madame Yale's Excelsior Hair Tonic. Leaves 2.09% of residue on evaporation, largely glycerin with cinchona

alkaloids. Gives slight reaction for borax or boric acid but shows no vesicating substance. Contains 17% of alcohol.

Knowlton's Danderine. Shows 4.55% of residue largely glycerin and borax or boric acid. Labelled as containing 10% of alcohol. Contains a small amount of salicylic acid and a vesicating substance, not identified.

Newbro's Herpicide. Leaves 2.5% of residue on evaporation, about 1% of which is salicylic acid with some borax or boric acid. Shows no alkaloids or vesicants. Contains 52.6% alcohol.

Foso Bark. This is a whitish, turbid looking liquid that leaves a residue on evaporation amounting to 0.46%. The most conspicuous ingredients are oil of wintergreen and what corresponds to onion juice, the former doubtless serving the double purpose of a medicant and a cover for the odor of the latter constituent. An alkaloid principle also contained in this preparation was unidentified. The sample showed a small amount of alcohol and some borax or boric acid.

If the findings of these chemists can be relied upon, and there is no reason to doubt but that they may, it is quite easy to see from the above that these highly vaunted preparations contain nothing very extraordinary in the way of ingredients. In fact, almost any mixer with a little ingenuity and a fair knowledge of the action of the different drugs might easily produce a preparation which would compare favorably with any of them so far as effect is concerned.

The following formulas have been carefully selected as producing good marketable specialties which will prove fully as satisfactory in use as any of the highly advertised preparations.

Sage Hair Tonic.

Fluid Extract of Sage	½ pint

Tincture of Green Soap	7	ounces
Tincture of Cantharides	1½	ounces
Glycerin	4	ounces
Menthol	2	drams
Bay Rum	1	pint
Oil of Bergamot	4	drams
Oil of Sweet Orange	4	drams
Alcohol	2	pints
Water sufficient to make	1	gallon

Dissolve the oils and menthol in the alcohol. Mix the fluid extract of sage with the glycerin, tincture of cantharides and bay rum. Mix the tincture of green soap with two pints of water, adding it gradually with contant stirring. Now mix these solutions, add water to make a gallon, let stand for a day and filter clear.

Menthol Hair Tonic.

Alcohol	1	pint
Bay Rum	2	pints
Camphor	½	ounce
Menthol	6	drams
Tincture Quillaja	6	ounces
Water	1	pint

Dissolve the camphor and menthol in the alcohol and add the tincture quillaja; add the bay rum to the alcoholic mixture and after shaking thoroughly add the water. If desired two to four ounces of glycerin may be added. Add color to suit, using liquid carmine for red or chlorophyll for green, then filter clear. In case it does not come up clear and sparkling after filtering, throw a handful of powdered carbonate of magnesia into the filtrate, let stand for a day or two with frequent shaking and re-filter.

Quinine Hair Tonic.

I.

Quinine Sulphate	1	ounce
Tincture of Krameria	2	ounces

Tincture of Cantharides	1 ounce
Spirit of Lavender	5 ounces
Glycerin	6 ounces
Alcohol	50 ounces

Mix all together, let stand for several days and if not clear filter.

II.

Quinine Sulphate	160 grains
Bay Rum	4 ounces
Glycerin	4 ounces
Tincture Cantharides	2 ounces
Tincture Capsicum	2 ounces
Alcohol	2 pints
Water	2 pints

Dissolve the quinine sulphate in the water, mix the other ingredients with the alcohol, then mix the two solutions. Let stand for two or three days and filter clear. Color as desired.

Antiseptic Hair Tonic.

Boric Acid	4 ounces
Resorcin	320 grains
Salicylic Acid	2 ounces
Glycerin	6 ounces
Alcohol	4 pints
Oil of Bergamot	3½ drams
Oil of Lemon	4 drams
Tincture of Saffron	enough to color
Water enough to make	1 gallon

Dissolve the boric acid, resorcin and salicylic acid in one quart of hot water, add the glycerin and allow to cool. Dissolve the oils in the alcohol and mix the two solutions. Then add the tincture of saffron and filter.

Hair Regenerator.

This formula furnishes a tonic which not only cleanses the scalp and preserves the growth of the hair, but also

darkens the hair and if used contantly will soon restore it approximately to its natural color.

Brandy	14	pints
Distilled Water	6	pints
Eucalyptus Bark	4½	ounces
Eucalyptus Leaves	4½	ounces
Cinchona Bark	9	ounces
Burdock Root	6½	ounces
Acid free Tincture of Iron	1¼	drams

Mix the brandy and water, add the bark, leaves and roots and macerate for two weeks with frequent shaking. Then drain, press out the liquid from the drugs and filter. Lastly add the tincture of iron.

Acid free tincture of iron is also known as dialyzed iron tincture. It may be obtained from any first class drug store and care should be exercised to get this instead of the ordinary tincture of ferric chloride which is commonly dispensed when tincture of iron is called for.

SHAMPOOS.

These preparations are designed to thoroughly cleanse the scalp, removing dandruff and any excess of oil which may be present in the hair. They are sold in various forms including pastes or creams, liquid, powder, etc. The formulas herewith will meet every requirement in this line.

Shampoo Cream.

I.

Cocoanut Oil	6 ounces
Cottonseed Oil	1 ounce
Caustic Potash	14 drams
Water	Sufficient

Heat the oils to about 175° Fahr., and add one half of the caustic potash dissolved in four onces of water. This should be added a little at a time with constant stirring. When the mixture begins to thicken add the remainder of

the caustic potash dissolved in eight ounces of water, adding gradually as before and heating so that the mixture boils gently. The scum which arises should be removed as fast as formed and the evaporation continued until the mixture will form a thick cream when cooled. As a perfume any desired essential oil or synthetic odor may be added. This should be put in after the boiling has completed and the mixture removed from the fire.

One of the best ways of putting up this preparation for the market is in clear glass jars holding two to four ounces, according to the price at which it is to be sold. The mixture should be poured into the jars after it has cooled sufficiently to prevent breaking them by the heat.

This formula gives an almost transparent product and if the evaporation has been carried far enough it will be sufficiently heavy to form a firm paste when cool. By dissolving the soap in alcohol and filtering, then evaporating the excess of alcohol by means of a water bath, the mixture will be more nearly transparent and possess a more attractive apearance. If this is done about two ounces of alcohol should be used to each six ounces of soap. If the alcohol is mixed with the soap while it is still in liquid form it will dissolve it without trouble.

II.

White Castile Soap	8 ounces
Potassium Carbonate	2 ounces
Water	12 ounces
Glycerin	4 ounces
Oil of Lavender	10 drops
Oil of Bergamot	20 drops

Shave the soap in thin slices and melt with the water on a water bath. When thoroughly melted add the carbonate and stir until dissolved. Allow to become nearly cold, then stir in the glycerin and oils. If too heavy, more water may

be added. The proportion of carbonate of potassium may also be varied to give any desired degree of alkalinity.

III.

Make as directed for No. 2, using transparent soap instead of the white castile. This gives a clearer cream than where the castile soap is used.

Liquid Shampoo.

I.

Green Soap	3 ounces
Alcohol	6 ounces
Water	4 pints

Heat the alcohol and dissolve the green soap in it, then add the water (warm) gradually with constant stirring. It may be filtered if not entirely clear. Any perfume desired may be added, dissolving in the alcohol and soap solution before adding the water. The addition of a small quantity of potassium carbonate (one-half to one ounce) will render the mixture more strongly alkaline and facilitate the removal of grease from the hair.

II.

Potassium Carbonate	1 ounce
White Castile Soap	4 ounces
Tincture of Quillaja	4 ounces
Oil of Lavender	½ dram
Alcohol	1 pint
Water	1 pint

Heat the alcohol, dissolve the soap in it and then add the oil of lavender and tincture of quillaja; dissolve the potassium carbonate in the water and mix the two solutions. Filter.

III.

Tincture of Quillaja	2 ounces
Ammonia Water	6 ounces
Cologne Water	2 ounces

Alcohol	4 ounces
Water	24 ounces

Mix, adding the water last.

This is sometimes referred to as a "dry shampoo" on account of the rapidity with which the hair dries after its use. For this reason it is especially adapted to ladies' use.

Powder Shampoo.

Powdered Borax	1 pound
Potassium Carbonate	1 pound
Powdered Castile Soap	4 ounces
Oil of Rose Geranium	2½ drams

Rub up the oil in a mortar with the borax, then mix this with the other ingredients by sieving.

Put up in closely stoppered bottles. For use, about two ounces of the mixture is dissolved in a quart of soft, warm water and used as any shampoo.

Most of the so-called egg shampoos are entirely free from any suspicion of egg albumen. This accounts for the reduced number of these preparations in the market since the passage of the Food and Drugs Act of June 30, 1906.

It is a very diffifficult matter to combine albumen with mixtures of soap, etc., and still have a presentable looking mixture. The alkali generally precipitates the albumen and in many liquid shampoos this precipitation would be caused by the alcohol used. For this reason I have given no formulas for egg shampoo, but would state that if you are willing to take the chances of the results just described occurring, the well beaten white of one or more eggs may be added to any of the creams or liquids for which the formulas have should be done after the mixture has become cool enough not to coagulate the albumen.

PERFUMES AND THEIR PREPARATION.

The history of perfumes is as old as the history of the human race. From the earliest times the extracting of odors

and the compounding of them into perfumes has been accounted among the fine arts and they have played a prominent part in the civilization of all ages. Among the ancient Egyptians many of their religious rites included the use of perfumes and they were also employed to a great extent in the preservation of the bodies of the dead. Without doubt their methods of embalming owed much of their effectiveness to the antiseptic action of the perfumes used in the process.

The art of Perfumery also reached a high degree of perfection among the Greeks and Romans and the perfumed baths of ancient Rome are famed in history. Even the barbaric races made use of perfumes in a crude form and the secret of their preparation was carefully guarded among the priests and wizzards of the tribe.

The development of the perfume industry from a scientific standpoint, however, is comparitively recent enterprise. Among the ancient peoples, perfume making was an art only, and little or no progress in the way of the discovery of new odors or improvements in the methods of extracting or compounding the various perfumes was made. It was not until the subject came to be considered in the light of scientific discovery and progress that it reached anything like its present high degree of perfection.

Before considering the processes of manufacturing perfumes and the presentation of formulas for same, it is advisable to touch briefly upon the materials entering into these products.

All materials used in the flavoring extract and perfume industries may be grouped into two general classes, viz., Natural and Synthetic.

By natural products are meant those which are directly drawn from flowers, leaves, roots, herbs, fruits, etc., either by expression, distillation, maceration or extraction with volatile solvents.

By synthetic products are meant those products which are obtained from a *natural* base by chemical treatment or by the combination of two or more organic or inorganic chemicals to produce the aromatic or odorous bodies. Great care is required in manufacturing these to eliminate the impurities and it is on the skill and care with which this is effected that the quality of the product largely depends.

To those unfamiliar with the subject, the word "synthetic" immediately suggests a coal-tar product and it is a quite general misconception that all such products are made from coal-tar. This, however, is far from the truth for, while many of the synthetics in common use are produced from coal-tar, a very large number of them are drawn directly from vegetable bases. Examples of this class of products are, vanillin, made from oil of cloves; heliotropin, from oil of camphor; terpinol, from the oil of turpentine, and ionone or synthetic violet from citral, the principal odorous constituent of oil of lemongrass.

It should also be understood that synthetics are not substitutes for the natural perfumes, but instead, special products having their own uses and filling a place which until their discovery was entirely vacant. Synthetics can never fill the place of natural products, and on the other hand, natural products cannot replace synthetics. In other words, it is possible to get a better product from a combination of natural and synthetic products than from the use of either alone.

Most synthetic products are designed to imitate more or less closely the composition of some natural product. With this purpose in view, careful analyses are made of the natural product and when the elements composing it are discovered, it becomes possible to locate these same elements in other less costly substances of vegetable or mineral origin, separate them from their present combination and recombine them

into artificial compounds resembling the natural product sought to be reproduced.

Fortunately for the scientist, Nature works with a comparitively small number of products and produces her varied effects by uniting them in an almost infinite number of combinations. Therefore, it is comparitively easy to locate the elements desired in other natural products than the one desired to be reproduced, and by certain chemical changes to break up their present combinations and recombine them as desired.

Although science has made rapid strides in this direction, there is still much to be desired It has not proven practical to imitate the delicate chemistry of nature in all of its infinite details and therefore it is not yet possible, and doubtless never will be, to reproduce successfully all the characteristic qualities of any natural product.

On the other hand, in extracting the odorous principles of natural products it is almost impossible to avoid losing certain odorous elements. It is in replacing these elements that synthetics find their greatest use. It seems as if synthetic products, as far as discovered, supplement the natural products most admirably. They seem to exactly fill in the missing notes in the odorous harmony, so that by a judicious blending of natural with synthetic products we are enabled to exactly reproduce the true natural odors of the living flowers.

As it is out of the question for the average perfume manufacturer to produce his own raw materials, but little attention will be given to the manner in which these are prepared and such information as is given will be general rather than specific in character, its purpose being to impart a general idea of the methods used, rather than to go into full detail regarding the technical points of the various operations.

In the direct extraction of natural flower odors several different processes are used. These include (1), extraction by pressure; (2), distillation; (3), by means of fixed solvents; (4), by means of volatile solvents and (5), infusion.

The simplest of these is that of extraction by pressure. This is applied to those substances in which the volatile oil is contained in the cells of the rind, as in fruits of the genus Aurantieae, viz., the orange, lemon and bergamot. In extracting the oils from these substances the best quality is obtained by hand extraction, i. e., scarifying or twisting the rinds until the oil cells are broken and absorbing the oil in sponges which, when saturated are squeezed into a container provided for the purpose. The second quality is obtained by pressure in screw or lever presses similar to those used in the manufacture of wine or cider.

The method most frequently employed in the extraction of volatile odors is that of distillation. This process depends upon the principal that if we heat a liquid in a continuous manner, its temperature will rise progressively up to a certain limit, depending upon the volatility of the liquid under operation and will then remain constant. At this temperature (the boiling point of the liquid) large quantities of the vapors will be evolved and any additional heat imparted to the liquid will be utilized for producing the change from the liquid to the gaseous or vapor state, instead of for raising the temperature. As an example, water placed in an open vessel over a fire will increase in temperature until its boiling point (212° Fahr.) is reached, when no matter how much heat is applied the temperature will remain stationary. In order to obtain a higher temperature it is necessary to confine the liquid.

It may be well to state at this point that the boiling point of a liquid will vary according to the atmospheric pressure to which it is subjected. The point indicated above (212° Fahr.) represents the boiling point of water at sea level and

as the attitude or height above sea level increases, the boiling point decreases in a direct ratio. It is only when the expansive force of the vapors evolved becomes strong enough to overcome the pressure of the atmosphere on the surface of the liquid that it boils, therefore, it may be easily understood that the greater the pressure the higher the boiling point and *vice versa.* In a vacuum, water will boil at a very low temperature.

If the vapors rising from the liquid being heated are passed through a tube or worm surrounded by cold water or cooled by other means, they will condense and again return to the liquid state.

As essential oils are more volatile, i. e., have a lower boiling point than water, they pass over as vapor at a comparitively low temperature. It is a somewhat curious fact that when two substances which are not non-miscible are heated together in the same vessel, they give off vapors independenly of each other and these vapors by their elastic force combine to overcome the surface pressure with the result that the boiling point of the liquid occurs at a temperature even lower than the boiling point of the more volatile substance.

In accordance with the principle just stated, if the oil bearing substances are added to water and the combined product submitted to heat, the oil and water will distill over together at a temperature below 212° Fahr., under normal atmospheric pressure. As esential oils are decomposed by high temperature and undergo various decompositions which completely alter their characteristic properties if exposed to too great a heat, it follows that the principle just stated is of the greatest practical value to the manufacturer of perfume products. By taking advantage of this law of nature he is enabled to separate the oils from the other constituents of the plant without their undergoing any sensible alteration.

As the combined vapors are condensed, the oil rises to

the top of the distillate and may easily be separated either by drawing off the water at the bottom or filling the container until it overflows in which case the oil would be forced out at the top. Various pieces of apparatus designed to facilitate this separation have been devised and are in common use.

Formerly this distillation was carried on by means of open fires, but with the progress of manufacturing science steam is now quite generally used for the purpose. This is utilized either by being conveyed directly into the still or into an outer space or jacket surrounding the still proper.

The water which passes over with the oil, retains a sufficient quantity of the oil in solution to give it the distinct odor of the flower. In the case of rose and orange flower distillation, this water possesses a distinct value and enters the market as rose water or orange flower water, as the case may be, but with most other flowers the water of distillation has no commercial use and, as the quantity of oil contained is so small as to render its recovery more expensive than its value would justify, it is thrown away.

The third method of extraction, viz., that by fixed solvents, is one of the oldest methods of obtaining odorous matter from flowers. Two forms of this method are in use, in one of which the solvent is used cold and the other in which the flowers are infused in the melted fat. These are known as *enfleurage* and *maceration* respectively.

The solvent used in these processes is generally suet or a combination of this with lard, although olive oil, paraffin wax and petrolatum have been employed to some extent. Whatever the solvent used, it must be of a high degree of purity and perfectly odorless.

Maceration is used for the extraction of those flowers whose odorous properties are not affected by a temperature high enough to melt the solvent. The fat being melted on a water bath, the blossoms are added to it and the mass con-

stantly stirred to assist the extraction. When the flowers have been exhausted they are replaced by fresh ones until the fat has become saturated with the perfume. In order to obtain pomades of known strength, definite quantities of flowers are used to each pound of fat, and such perfumed fat as may be retained by the exhausted flowers is recovered by pressing them by hydraulic presses at a temperature sufficient to melt the fat.

Where oils are used instead of fats, the product is known as perfumed oil instead of a pomade.

This method of extraction is applied to roses, orange flowers and the blossoms of the accacia, the latter of which yield the perfume commonly known as *cassie*.

With those flowers whose oils are decomposed or rendered less delicate by the heat necessary for maceration, enfleurage is employed. In this process, the fat is spread on sheets of glass and the blossoms laid between these sheets in a wooden frame or *chassis*. The fat gradually absorbs the odorous principles of the flowers which, as soon as they are exhausted, are replaced by fresh ones until a sufficient quantity of blossoms has been treated to sufficiently impregnate the fat with the odor. If it is desired to use oil instead of fat, the process is varied by replacing the sheets of glass with cloths saturated with the oil.

During the past few years the fourth mentioned process has been rapidly growing in favor. It gives us the odor of the flower in a most convenient form for handling and is free from many other of the objectionable points of the older methods of extraction.

This process depends upon the affinity of certain very volatile hydrocarbon products for natural oils. The substance most commonly used for this form of extraction is light petroleum ether, having a boiling point below 212° Fahr., at normal pressure. This substance is brought into contact with the flowers until it has dissolved their odorous

principles. It is then distilled by means of steam in a vacuum, the temperature required to vaporize it under these conditions being so low as not to affect in any way, even the most delicate odors. The residue consisting of the odorous substances mixed with fatty and wax-like materials is then treated with cold alcohol, yielding the perfume in a perfectly pure state. This gives us the odorous matter in a highly concentrated form, to which the name "concrete," "floressence" or "solid essence" is applied.

Aside from possessing a delicacy of odor not obtainable by other means, these "concretes" are concentrated to such a degree that the cost of transportation is reduced to a minimum and they are gradually replacing other forms of natural perfume products. Combined with various synthetics, they give us the highest types of perfumes in the market to-day.

Infusion, which has been mentioned as a process applied to the extraction of odorous matters, consists simply in macerating the substance to be extracted in alcohol until it is exhausted. It is applied to such materials as gums, balsams, vanilla beans, musk, etc., and the resulting product is known as a tincture.

The preparation of the so-called synthetic perfume materials is altogether too complicated a matter to take up in detail in a work of this kind. I have given a rather complete description of the methods employed in the production of one synthetic (ionone), and this will serve to illustrate the principles on which the work is conducted.

In making "washings" or tinctures from concretes, one ounce of the concrete is mixed with one pint of warm alcohol and allowed to stand for an hour or so with frequent agitation. It is then filtered and diluted to one gallon with alcohol. Tinctures made in this way may be used wherever the formula calls for tinctures or pomade washings. If de-

sired to make a stronger tincture, it is only necessary to increase the proportion of the concrete. These concretes range in price from about $4.50 per ounce for rose, cassie and jasmin to $12 per ounce for the finest violet. It is easy to see that at these prices washings made from concretes are cheaper than pomade washings of equal strength made in the regular manner.

Flower pomades may be purchased at about $1.60 to $2.50 per pound, according to odor. While there is no absolute rule as to the exact quantities of pomades to be used to a given quantity of alcohol, each manufacturer having his own system in this matter, generally speaking from four and one-half to five pounds of pomade to the gallon will give the most satisfactory results. Of course, this may be varied to give washings of almost any desired cost of production, but it is better to make them full strength and then dilute later on with alcohol to bring the cost down to the desired figure.

In washing pomades various methods are employed, the object of all being to extract as completely as possible the odorous substance which they contain. Cold infusion is to be preferred to warm infusion as it gives us the odor in a truer and more delicate form. This process requires a considerably longer time than is required for extraction with warm alcohol, about six weeks being necessary with the former against ten day to two weeks with the latter.

It is impossible to completely extract the odorous matter from a pomade in one washing, it being customary with most manufacturers to make three washings, the second and third of which, while they are not equal to the first in strength, being of value in diluting perfumes and in some formulas definite portions of the first and second washings of a given pomade are specified. Some manufacturers mix the results of the first two washings and use the third wash-

ing for such purposes as will be met by an essence of second quality.

In many establishments, two cold and one warm infusion of the pomade are made, which is probably the most satisfactory method. The pomade after the third washing has a commercial value, being utilized in the production of toilet creams and similar products, for which purpose it is superior to ordinary fats on account of its high degree of purity and its pleasant flower-like odor.

Various machines have been devised for use in washing pomades, but where this work is done on a small scale no special machinery is required. Glass bottles of the required size are used to hold the pomade and the solvent, the required amount of agitation being given the mixture by frequent shaking.

The first step in the washing of any pomade is dividing it into small portions. The larger the surface of the pomade that can be brought into contact with the alcohol, the shorter will be the time required to extract the odor. A most convenient method of dividing the pomade into small pieces is to have a tin tube or cylinder made, about three or four inches in diameter and twelve inches in height. This is open at one end, the other being closed with the exception of a number of fine openings. A piston should be made which will exactly fit the inside of the cylinder. In use, the pomade is placed in the tube, and by means of the piston forced through the fine openings in the bottom plate. If the washing bottles are of the wide mouthed variety the pomade may be passed directly from the cylinder into the bottles containing the alcohol.

The alcohol to be used in perfume making should be deodorized and of 95% strength. This is often sold under the name of cologne or perfumer's spirit.

As the fats used in the production of flower pomades are soluble to some extent in strong alcohol it follows that

the pomade washings contain in addition to the alcohol and odorous substances a small proportion of fat. This must be got rid of in some manner, otherwise it will turn rancid and spoil the perfume. In order to eliminate the fat the solution is cooled sufficiently to cause it to congeal and separate, this process being known as "chilling" the pomade washing. In order to be certain that all the fat is removed, it becomes necessary to subject the solution to a degree of cold approximating the Fahrenheit zero. This is accomplished by placing the bottle containing the solution in a mixture of ice and salt or some similar substance which will produce the degree of cold required. The fat, as it congeals, will adhere to the bottom and sides of the chilling bottle and the clear liquid may be decanted.

In referring to the solution of the concrete essences in alcohol, I have called them tinctures. This term is also sometimes applied to pomade washings, but such use of the term is likely to lead to confusion, tinctures proper being solutions made by directly dissolving an oil in alcohol or by extracting the soluble portions of gums, resins, powdered drugs, etc., with the same solvent. In the formulas which follow, I shall refer to pomade washings as extracts to distinguish them from the tinctures made from concretes, and the other tinctures referred to above. It must be kept in mind, however, that while a tincture made by dissolving in alcohol a flower oil obtained by distillation, will not replace the washings of pomades made from the same flower, that tinctures made from concretes may be substituted for the corresponding pomade washing with good results.

For example, a tincture of rose made by dissolving otto of roses in alcohol, will not accomplish the same purpose in perfume compounding as rose pomade washing, but the tincture of rose concrete may be substituted for rose pomade washing in any case where its use may be deemed desirable. In some formulas both pomade washings and tinc-

tures of the same flower odor made by dissolving the distilled oil in alcohol may be called for. By a clear understanding of this point the mixer will avoid any confusion which might otherwise arise.

Aside from the tinctures already referred to, i. e., those made from concretes, the following find considerable employment in perfume compounding:

Tincture of Ambergris.

This is made by macerating ambergris in small pieces in alcohol for from three to six weeks and the product filtered. One ounce of ambergris to a quart of alcohol is the correct proportion.

Tincture of Musk.

Make as directed for tincture of ambergris, except that one-half ounce of grain musk is used to each quart of alcohol.

Both musk and ambergris are largely used in perfumes, principally for their value as fixatives.

Tincture of Benzoin.

Benzoin	2 ounces
Alcohol	1 quart

Add the benzoin in powder or in small pieces to the alcohol, macerate for two or three weeks, then filter.

Tincture of Vanilla.

Best Vanilla Bean	1¾ ounces
Alcohol	1 quart

Cut the beans in small pieces, macerate in the alcohol in a moderately warm place for six weeks, then filter. At present this is largely replaced by solutions of vanillin and coumarin.

Tincture of Orris.

Powdered Orris Root	1¼ pounds
Alcohol	1 quart

Macerate for ten days in a moderately warm place, agitating frequently, then filter. This is now largely replaced by a tincture made by dissolving oil of orris in alcohol.

Tincture of Civet.

Civet	½ ounce
Alcohol	1 quart

Prepare as directed for tincture of ambergris.

This is now largely replaced by solutions of "civette" or artificial civet. Used chiefly as a fixative.

Tincture of Ambrette (Musk Seed).

Ambrette	8 ounces
Alcohol	1 quart

Macerate for thirty days, then filter.

Tincture Tonka.

Tonka Bean	4 ounces
Alcohol	1 quart

Prepare as directed for tincture of vanilla.

This is largely replaced at present with solution of coumarin.

The following essences from essential oils are also employed in perfumery.

Essence Bitter Almond.

Oil of Bitter Almond	1 ounce
Alcohol	10 ounces

Mix and dissolve.

Essence Bergamot.

Oil of Bergamot	1 ounce
Alcohol	10 ounces

Mix and dissolve.

Essence of Cassia. (Cinnamon.)

Oil of Cassia	1 ounce

Alcohol	10 ounces

Mix and dissolve.

Essence of Cloves.

Oil of Cloves	1 ounce
Alcohol	10 ounces

Mix and dissolve.

Essence Lavender.

Oil of Lavender Flowers	1 ounce
Alcohol	10 ounces

Mix and dissolve.

Essence of Lemon.

Oil of Lemon	1 ounce
Alcohol	10 ounces

Mix and dissolve.

Essence of Verbena. (Lemongrass.)

Oil of Verbena	1 ounce
Alcohol	1 pint

Mix and dissolve.

Essence of Neroli.

Oil of Neroli (best)	1 ounce
Alcohol	1 pint

Mix and dissolve.

Essence of Orange.

Oil of Orange (sweet)	1 ounce
Alcohol	10 ounces

Mix and dissolve.

Essence of Patchouly.

Oil of Patchouly	1 ounce
Alcohol	1¼ pints

Mix and dissolve.

Essence of Rose.

Oil of Rose	1 ounce

Alcohol	1¼ pints

Mix and dissolve.

This is now replaced largely by rhodinel or synthetic rose, or solutions of oil of rose, artificial.

Essence Rose Geranium.

Oil of Rose Geranium	1 ounce
Alcohol	1½ pints

Mix and dissolve.

Essence Rosemary.

Oil Rosemary	1 ounce
Alcohol	10 ounces

Mix and dissolve.

Essence of Santal. (Sandalwood.)

Oil of Sandalwood	1 ounce
Alcohol	1¼ pints

Mix and dissolve.

Essence Ylang-ylang.

Oil of Ylang-ylang	¼ ounce
Alcohol	1 pint

Mix and dissolve.

This is now largely replaced with artificial Ylang-ylang.

In all experiments in perfume making it must be kept in mind that time is required for the proper assimilation or blending of the various elements used. For this reason, a perfume should not be judged as soon as made, but rather after it has had time to "age" or blend, which will mean a week or ten days. Of course, the perfume will continue to improve for many months after making, provided it is properly stored, but this is more along the line of mellowing and ripening than any decided change in the general odor after the ingredients have had time to lose their identity and become blended into one harmonious whole.

In aging perfumes, they should be stored in a cool, dark place. Under these conditions they will not only ripen faster

but will develop a delicacy of odor which is not obtainable unless these precautions are observed in the ageing.

Several firms in New York City and elsewhere make a business of supplying perfume materials in concentrated form which only require to be mixed with alcohol to produce a finished odor. For the production of small quantities of perfumes these materials will be found both satisfactory and economical, but in manufacturing on a commercial scale it will be found cheaper and more satisfactory to make your own blends.

Most of the dealers in perfume materials have an expert perfumer in charge who will at any time furnish information to regular customers of the house concerning the best methods of manipulating their products to produce high grade odors. They are generally willing to supply their customers with special formulas for any particular odor they may desire to produce without making any charge for the information. Such information is of the greatest importance and value to the manufacturer, whether amateur or professional, and the fact that you are able to obtain such instructions will often enable you to produce perfumes of much better quality than you would otherwise be able to do. Furthermore, these suggestions will enable the manufacturer to save much time and trouble in experimenting with new odors as well as to make up his regular line in the most economical manner.

I have stated elsewhere that hard and fast formulas for perfumes are of less value than most persons would be inclined to suppose. Sometimes a slight variation in a formula will greatly improve the odor of the perfume and anyone engaging in this line of work should cultivate the ability to modify any formula he may be using in order to bring about such results. It would be impossible to describe just what goes to make up a perfect perfume as it would be to explain in cold type the delicate graduations of color, light

and shade which give the beauty to a fine painting, but in the same manner as an artist learns to appreciate the varying effects of light and shade or the musician to immediately detect a false or imperfect note, the perfumer learns by experience to detect any imperfection or defect in the odorous harmony of a fine perfume and to make such changes in the formula from which it is produced as will serve to overcome the defects and bring out the true flowery odor in all its natural delicacy and beauty.

In view of the fact that violet perfume is beyond question the most popular of all odors, it seems appropriate that we should consider it first. In discussing this and all other perfumes, I wish to make it plain that the giving of hard and fast formulas is not advantageous. To the man who has made a study of the work and who has the requisite good judgment and cultivated sense of smell, it is only essential that he should know what odorous elements are required to produce the odor and his own taste will dictate the proper proportions.

As we study the formulas of the old perfumers we are impressed with their unsatisfactory nature. The elements to which they were confined did not produce a true violet odor, notwithstanding the fact that violet pomade washings formed the base of the perfume, but instead their products were dominated by some foreign note, such as vanilla or jasmin. These old-time manufacturers also used extract of orris extensively, but this was objectionable to the discriminating user of perfumes, owing to the fact that any infusion of orris contains various resins, etc., in addition to the irone, the odorous principle, they were trying to separate. At the present time orris is quite extensively used in violet perfume, but it is in the form of an essence or extract made from the oil of the root, which gets rid of the objectionable portion of the odor.

For much of the information regarding Synthetic Violet, I am indebted to the American Perfume.

The real worthlessness of the formulas used in attempting to duplicate the odor of the violet flower was well known to the manufacturers and they were constantly studying methods of improving their product. These experiments did not result in accomplishing anything of any great importance until the year 1893 when Tieman and Kruger discovered a method of making ionone or synthetic violet. This discovery proved the solution of the entire problem and from the time it was made to the present, it has been a comparitively simple matter to produce a really satisfactory violet perfume.

By referring to the chapter on synthetics, it will be easily understood that the problem which has confronted the experimenters along this line was, by the combination of various chemicals to produce a substance which should possess the same chemical composition as ionone. Failing in their attempts to obtain this from orris root alone, they turned their attention to the possibility of using other substances containing the elements needed, and by the chemical processes, isolating these elements and combining them in the proper proportions. With this idea in mind experiments were made with acetone and citral which resulted in the obtaining of a ketone which was identical in composition with irone, but the odor of this was entirely unlike that of the substance they were attempting to duplicate. Then they subjected this product to further chemical action thus *isomerizing* it with the result that although this compound had identically the same number of atoms of the same kind in the molecule they were arranged differently. The resulting product was exactly what they had been looking for and gave forth an odor resembling violets to a most marked degree. By isomerizing a product is meant by bringing about of a change in the arrangement of the atoms in the molecule without altering their relative proportions. Just as the same letters may be arranged so as to spell several different

words, so the atoms in certain molecules may be arranged in various ways and with each change of arrangement will come a change in the characteristic properties of the substance.

For example, starch and sugar are identical in chemical composition but the manner of combination of the oxygen, hydrogen and carbon atoms is different in the two substances. By submitting starch to the action of dilute acids the re-arangement of the atoms is effected and the resulting product is known as glucose, which is a form of sugar. This property of certain substances in breaking up the molecules and effecting a rearrangement of their component atoms is turned to account in the synthesis or artificial production of various compounds, and in many cases it is possible to produce an artificial compound in this way which, while it possesses all the properties of the natural substance it represents, may be prepared at a small fraction of the cost of the natural product.

Their discoveries and processes were immediately protected by patents and for a time the price was held so high that it was out of the question for the average perfumer to make use of their product, but with improved methods of production the price was gradually reduced to a point where ionone came into general use.

With the expiration of the original basic patent (Tieman, Mar. 24, 1896, U. S. Patent No. 556943), which expired before the term for which it was issued had been completed, owing to the expiration of an earlier English patent for the same product and process, certain other manufacturers took up the production of ionone. This was contested by the original manufacturers and the matter is still somewhat unsettled, however, it is generally conceded that unless the processes of products conflict with the Ionone Derivative patent of March 8, 1896 (Edgar de Clair U. S. Pat. No. 600429), which is still in force, that no action can be

taken against them which will hold in a court of law. The original German patent expired in April, 1908.

The result of the increased production of the article has brought the price from about $135 per pound to something like $72 per pound. $50 per pound is now asked in this country for an 8% solution, while up until the last few months $100 per pound for a 10% solution has been about the usual rate.

It is customary with perfumers to give their product some distinguishing note, hence the wide variation of the violet perfumes on the market. This matter will be taken up under the proper heads.

The vehicle of all violet perfume worthy of the name is a mixture of extracts from violet, rose and jasmin pomades or concretes. Some consider the addition of a little tuberose pomade washing an improvement, owing to the sharp sweetness of this product and others use a small percentage of cassie to give depth to the odor.

In violet, as in other perfumes, certain adjuncts or auxiliaries to the predominant odor must be used for the purpose of adding body and lasting qualities to the perfume. Tincture of orris and vanilla are often used in intensifying, but great care should be taken in their employment, especially the latter. As fixatives, tinctures of musk, civet and ambergris are used. Just now there is a strong tendency among manufacturers to use artificial musk in place of the genuine article and this seems to be a marked improvement, this product amalgamating perfectly with the delicate odor and being unexcelled for tenacity.

The more modern makers are using Heliotropin in place of vanilla, which also is an improvement, as its flowery sweetness blends perfectly with the synthetic violet and other products used, making an ideal perfume.

The true base of the perfume is the Synthetic Violet. This should be used in moderation, as increasing the quan-

tity only results in increasing the cost and imparting a rough odor instead of giving a more pronounced odor of violets.

The following formulas will give a high grade violet perfume which will compare favorably with the best on the market:

I.

Ionone (100%)	2	drams
Heliotropine	2	drams
Oil Orris concrete	4	drams
Oil Violet concrete	1	ounce
Tincture Artificial Musk	4	ounces
Tincture Civet	1½	ounces
Extract Cassie	4	pints
Extract Rose	2	pints
Extract Jasmin	1	pint
Alcohol sufficient to make	1	gallon

Mix and after standing for a sufficient time to blend properly, filter. A trace of green color may be added if desired.

II.

Violet de Parme.

Extract Cassie	15	ounces
Extract Rose	10	ounces
Extract Tuberose	10	ounces
Extract Violet	20	ounces
Tincture of Orris	10	ounces
Oil of Bitter Almonds	3	drops
Tincture Artificial Musk	3	ounces

Mix, age and filter.

III.

Solution of Ionone (1 in 64)	1	pint
Oil of Orris concrete	1	dram
Oil of Bergamot	¼	dram
Solution Artificial Musk	1	ounce
Oil Ylang-ylang	3	drops

Extract Jasmine	3 ounces

Mix, age and filter.

Next to violet, the perfume of roses is beyond question the most popular. While an almost infinite variety of formulas for this odor might be given, I shall confine myself to a few which have proven superior to most of the others which have come to my notice.

Cut Roses.

Oil of Rose	1 ounce
Tincture of Rose concrete	1 gallon
Heliotropine	4 drams
Tincture of Civet	1 ounce
Hyacinth, synthetic	2 drams

Mix, age and filter.

White Rose.

Extract of Rose	2 pints
Extract of Jasmine	1 pint
Extract of Violet	2 pints
Essence of Patchouly	½ pint
Essence of Rose	1 quart

Mix, age and filter.

Moss Rose.

Extract of Rose	4 pints
Extract of Orange Flower	2 pints
Essence of Rose	2 pints
Tincture of Ambergris	1 pint
Tincture of Musk	½ pint

Mix, age and filter.

Tea Rose.

Extract of Rose	2 pints
Extract of Geranium	2 pints
Extract of Orange Flower	½ pint
Essence of Rose	2 pints
Tincture of Santal	½ pint

Tincture of Orris ½ pint

Mix, age and filter.

Any of the above formulas may be cheapened by diluting with alcohol to any desired degree. The use of synthetic oil of rose instead of the true oil in making the essence of rose will also be found advantageous from the standpoint of cost.

These formulas as well as all others given under this head represent full strength products, the kind that are usually sold as quadruple extracts. In order to reduce the price or make a second quality it is only necessary to increase the proportion of alcohol to the odorous matter. I wish to say, however, that the talk you sometimes hear of making a high grade perfume at a cost of three to four dollars per gallon is not to be relied upon as representing the true facts in the case. While it is possible to produce certain odors at a figure not greatly above these prices, it is impossible to make a rose or violet perfume which will meet the requirements of critical users without paying a considerably higher figure. My advice to all perfume manufacturers would be to produce high grade odors and then ask a fair price for them. If you are obliged to cater to a cheap trade or come into competition with the class of perfumes sold at a few cents per ounce, it is only necessary to add sufficient alcohol to the products resulting from the formulas given herein to bring down the cost to the required figure. If you use the formulas as given you may be assured that no one will have a better quality of goods than yourself and even when considerably diluted they are much superior to the odors made from cheap materials, the odor being true to nature, and the perfumes differing from the better grades only in strength and lasting quality.

LILAC.

Most of the lilac perfumes on the market are compounds of maguet or terpineol with various other odorous sub-

stances designed to intensify the odor and render it truer to nature. There is on the market what is known as oil of lilac, but most of this is fabricated from various synthetics and concretes instead of being extracted from the lilac flowers. A combination often sold under this name is made from terpineol and oil of rose geranium, using about 2½ drams of the latter to each ounce of terpineol.

The following formulas have proven satisfactory:

White Lilac.

I.

Tincture of Jasmine	1 gallon
Tincture of Orange Flowers	8 ounces
Tincture of Civet	8 ounces
Tincture of Vanillin	2 pints
Heliotropine	1 ounce
Oil of Lilac	1 ounce

Mix, age and filter.

II.

Extract of Orange Flowers	4 pints
Extract of Tuberose	6 pints
Oil of Bitter Almonds	15 grains
Terpineol or Muguet	½ ounce
Tincture of Civet	4 ounces

Mix, age and filter.

HELIOTROPE.

Heliotropine	5 drams
Oil of Cloves	3 drops
Coumarin	1 dram
Oil of Jasmine	1 ounce
Alcohol	1 gallon

Mix, age and filter.

HYACINTH.

Hyacinth synthetic	1 ounce
Terpineol	2 drams

Ylang synthetic	1½ drams
Alcohol	4 pints

Mix, age and filter.

TREFLE.

This name is applied to a series of odors of the sweet clover type. In most of these artificial musk is employed and furnishes the pleasant "after odor" of the perfume. The real basis of the odor is a combination which is commonly known as lily of the valley and often sold as a perfume under that title. The following formula is typical of this class of odors:

Extract of Lily of the Valley	1 gallon
Amyl Salicylate	100 minims
Tincture Artificial Musk	4 ounces
Oil of Neroli	2 drams
Hyacinth synthetic	2 drams
Tincture of Civet	3 ounces
Tincture of Oak Moss	4 ounces

The tincture of oak moss is made on the basis of two pounds of the moss to a gallon of spirit. The extract of lily of the valley may be prepared by the following formulas:

Lily of the Valley.

I.

Tincture of Tuberose	24 ounces
Tincture of Jasmine	24 ounces
Tincture of Civet	4 ounces
Tincture of Vanillin	8 ounces
Oil of Santal	2 drops
Oil of Linaloe	2 drams
Oil of Lilac, artificial	20 drops
Oil of Coriander	20 drops

Mix, age and filter.

II.

Extract of Violet	3 pints

Extract of Jasmine	5 pints
Extract of Tuberose	3 pints
Tincture of Vanilla	½ pint
Extract of Rose	3 pints
Alcohol	15 pints
Oil of Linaloe	4 ounces
Oil of Ylang ylang	1 ounce

Mix, age and filter.

CRABAPPLE.

Extract of Violet	2 pints
Extract of Rose	1 pint
Extract of Jasmine	½ pint
Extract of Cassie	½ pint
Essence of Ylang ylang	3 ounces
Essence of Linaloe	1 ounce
Essence of Neroli	2 ounces
Essence of Rose	2 pints
Essence of Rose Geranium	1 pint
Tincture of Hyacinth synthetic	1 pint
Tincture of Musk	8 ounces
Oil of Mace	10 drops
Alcohol enough to make	9 pints

Mix, age and filter.

JOCKEY CLUB.

I.

Tincture of Cassie	2 pints
Tincture of Tuberose	2 pints
Tincture of Jasmine	2 pints
Tincture of Vanillin	2 pints
Tincture of Civet	10 ounces
Oil of Rose	1 ounce
Oil of Bergamot	1 ounce

Mix, age and filter.

II.

Extract of Cassie	1	pint
Tincture of Ambergris	12	ounces
Extract of Rose	1½	pints
Extract of Tuberose	12	ounces
Tincture of Orris	3	pints
Essence of Rose	1½	pints
Oil of Bergamot	6	drams

Mix, age and filter.

III.

Extract of Rose	2	pints
Extract of Cassie	1	pint
Extract of Tuberose	1½	pint
Tincture of Orris	2	pints
Tincture of Musk	2	ounces
Tincture of Civet	4	ounces
Essence of Rose	4	pints
Oil of Bergamot	1	ounce
Benzoic Acid	2	drams
Alcohol	4½	pints
Water	½	pint

Mix, age and filter.

HONEYSUCKLE.

Tincture of Rose	1	pint
Tincture of Jasmine	1	pint
Tincture of Violet	1	pint
Tincture of Civet	1	ounce
Tincture of Vanillin	3	ounces
Tincture of Artificial Musk	2	ounces
Oil of Rose (artificial)	1	dram
Oil of Bergamot	1	dram
Oil of Angelica	5	drops
Oil of Sandalwood	½	dram
Alcohol enough to make	½	gallon

Mix, age and filter.

CARNATION.

Oil of Cloves	20 drops
Extract of Cassie	1 pint
Extract of Jasmine	1 pint
Extract of Orange Flowers	4 pints
Extract of Rose	2 pints
Tincture of Civet	½ pint
Tincture of Vanilla	½ pint
Tincture of Storax	4 ounces
Tincture of Ylang ylang	1 pint

Mix, age and filter.

ORIENTAL BLOSSOMS.

Oil of Neroli, synthetic	10 drops
Oil of Rose, synthetic	6 drams
Oil of Sandalwood	2 drams
Civette (synthetic civet)	10 drops
Muguet	3 drams
Artificial Musk	½ dram
Alcohol sufficient to make	½ gallon

Mix, age and filter.

FRANGIPANNI.

Oil of Rose, synthetic	4 drams
Oil of Rose Geranium	2 drams
Oil of Bergamot	2 drams
Oil of Sandalwood (true)	4 drams
Oil of Neroli	4 drams
Tincture of Artificial Musk	8 ounces
Tincture of Vanillin	8 ounces
Tincture of Orris	2 pints
Cinnamon Water U. S. P.	8 ounces
Stronger Orange Flower Water	8 ounces
Alcohol sufficient to make	1 gallon

Mix, adding the water last. Age and filter.

The tincture of artificial musk for this formula is made on the basis of 25 grains of artificial musk to a pint of alcohol. The tincture of vanillin is made on the basis of one ounce of vanillin to a gallon of alcohol.

SPECIAL BOUQUET ODORS.

These perfumes are suitable for marketing under any special title you may select.

I.

Extract of Jasmine	3 pints
Extract of Tuberose	1½ pints
Extract of Cassie	18 ounces
Extract of Rose	12 ounces
Essence of Rose	12 ounces
Tincture of Coumarin	6 ounces
Tincture of Civet	6 ounces
Oil of Bergamot	1 ounce
Oil of Rose Geranium	1 ounce
Oil of Neroli	1 dram
Oil of Rose, synthetic	1 dram
Oil of Cardamon	1 dram

Mix, age and filter.

II.

Extract of Orange Flowers	40 ounces
Extract of Cassie	20 ounces
Extract of Tuberose	20 ounces
Extract of Jasmine	20 ounces
Essence of Rose	10 ounces
Essence of Rose Geranium	10 ounces
Tincture of Ambergris	4 ounces
Tincture of Musk	4 ounces

Mix, age and filter.

III.

Extract of Violet	4 ounces
Oil of Bergamot	2 drams

Grain Musk	20 grains
Oil of Sandalwood	1 drop
Oil of Lavender Flowers	2 drams
Oil of Rose	1½ drams
Orange Flower Water	3 ounces
Alcohol enough to make	2 pints

Mix, age for at least thirty days, then filter.

IV.

Extract of Rose	4 ounces
Extract of Violet	4 ounces
Extract of Tuberose	4 ounces
Tincture of Vanilla	1 ounce
Tincture of Tolu	1 ounce
Tincture of Musk	1 ounce
Oil of Neroli	3 drops
Oil of Bitter Almonds	2 drops
Alcohol enough to make	1 pint

TOILET WATERS.

They are simply dilute perfumes, the better class having no water whatever in their composition. They may be made of any desired strength by simply diluting any of the above perfumes with alcohol. A good general formula will be two pints of any of the above odors with alcohol sufficient to make one gallon. Of course, they may be made still cheaper by increasing the proportion of alcohol.

If desired to add water to these products, it should be added until the mixture begins to turn milky and will not clear up by shaking. Allow to stand for several days, then filter, throwing a handful of powdered carbonate of magnesia into the filter, if necessary, to clear the product.

EAU DE COLOGNE.

It would be difficult if not impossible to say definitely to whom the discovery or invention of Eau de Cologne should be credited, several different persons laying claim to

the honor and considerable difference of opinion on the subject existing among students of the history of perfumery. The most authentic evidence available seems to point to one Johan Maria Farina, a perfumer of Cologne, Italy, as the one to whom the honor really belongs, the discovery being made between the years 1690 and 1709. At any rate the name Farina in connection with a cologne water was for many years considered a guarantee of excellence and even though it has lost much of its former prestige by being applied rather indiscriminately to products of very ordinary quality, it is still considered a valuable trade mark by at least one prominent firm of perfumers.

Probably no other article of commerce has ever had so many different formulas given for its production as this, my own collection containing over three hundred different varieties. From this list I have selected the following as being typical of the best grades now on the market:

I.

Oil of Neroli	1 ounce
Oil of Rosemary	½ ounce
Oil of Sweet Orange	10 drams
Oil of Citron	10 drams
Oil of Bergamot	½ ounce
Alcohol	1½ gallons

Mix, age and filter.

II.

Oil of Bergamot	100 minims
Oil of Lemon	50 minims
Oil of Portugal	30 minims
Oil of Petit Grain	10 minims
Oil of Lavender	20 minims
Oil of Rosemary	15 minims
Alcohol	30 ounces
Rose Water	9 drams

Orange Flower Water	9 drams
Distilled Water	9 drams

Mix the oils with the alcohol and set aside for a week, shaking frequently, then add the waters which have been previously mixed, let stand for another week and filter.

III.

Oil of Bergamot	2 drams
Oil of Lemon	1 dram
Oil of Neroli	20 drops
Oil of Organium	6 drops
Oil of Rosemary	20 drops
Alcohol	20 ounces
Orange Flower Water	1 ounce

Mix, age and filter.

EAU DE COLOGNE OIL.

Oil of Bergamot	8 ounces
Oil of Lemongrass	1 ounce
Oil of Lavender	4 ounces
Oil of Lemon	2 ounces
Oil of Neroli	2 drams
Oil of Rosemary	1 ounce
Alcohol	1 pint

Mix.

This is to be used for making cologne, using one ounce or more to a gallon of alcohol, according to the strength desired.

FLORIDA WATER.

This is a combination of odorous substances and the varieties are almost as numerous as in the case of Eau de Cologne.

I.

Oil of Lavender	½ ounce
Oil of Bergamot	1 ounce
Oil of Cinnamon	1 dram

Oil of Cloves	½ dram
Oil of Neroli	½ dram
Tincture of Musk	½ ounce
Alcohol	45 ounces

Cinnamon Water U. S. P. enough to make ½ gallon

Mix the ingredients in the order given, let stand for a week or two and filter.

II.

Oil of Bergamot	10 drams
Oil of Lemon	6 drams
Oil of Lavender	1 ounce
Oil of Sweet Orange	½ ounce
Oil of Cloves	1 dram
Oil of Cinnamon	1 dram
Oil of Neroli	1 dram
Rose Water	2 pints
Alcohol	1 gallon

Mix, age and filter.

VIOLET WATER.

Extract of Violet	1 pint
Extract of Cassie	6 ounces
Tincture of Rose	6 ounces
Tincture of Orris	1 pint
Ionone Solution (10%)	1 ounce
Alcohol sufficient to make	1 gallon

Mix, age and filter.

This product is usually colored green, using a considerably higher percentage of color than is used in the violet perfume.

LAVENDER WATER.

This is distinctly an English specialty, holding about the same position of importance in that country that Florida water does in the United States.

I.

Oil of Lavender	4 ounces
Oil of Bergamot	2 ounces
Tincture of Ambergris	1 ounce
Tincture of Musk	1 ounce
Oil of Angelica	16 drops
Oil of Rose	24 drops
Alcohol sufficient to make	1 gallon

Mix, age and filter.

II.

Oil of Lavender	1½ ounces
Oil of Bergamot	½ ounce
Tincture of Ambergris	½ ounce
Alcohol enough to make	7 pints

Mix, age and filter.

In making up the above formulas, English oil of lavender should be used to get the highest quality of products. The mixture should be allowed to age for at least a month before filtering.

COLORS FOR PERFUMES.

The chief object to be aimed at in coloring perfumes is to obtain a color which will not in any way affect the odor and will be permanent to light. Probably it would be the best plan to buy these colors from some concern making a specialty of this class of goods as these concerns employ expert color makers who have learned by long experience how to produce the best possible coloring material for the specific purpose for which it is intended. In the absence of these colors, the anilines offer a simple solution of the problem of coloring perfumes. These may be had in an almost endless variety of colors and are fairly permanent to light.

There is a tendency on the part of amateur perfume makers to overdo the coloring of their products. This is objectionable, the merest trace of color sufficing to give the

perfume an attractive appearance. If too much color is used the perfume will be likely to stain fabrics with which it comes in contact.

Chlorophyll makes a fine green color for violet and by using varying proportions of tincture of tumeric or saffron with either chlorophyll or green aniline a series of very pleasing color effects may be obtained.

The best rule to be followed in coloring perfumes is to note the colors used by the largest concerns in this line and then to color your products accordingly. There is a growing tendency toward marketing many odors in a water white or uncolored form and the idea seems a very good one except in cases where your trade demands a colored product.

The coloring of perfumes seems to be based on no rule except that of usage. No one knows just why a violet perfume should be given a green tint, but nine out of every ten manufacturers use this color for their violet odor. If you follow the lead of the best makers in the matter you cannot go far wrong.

Toilet waters are given the same colors as the perfumes of the same odor, but are generally higher colored than the perfumes.

SACHET POWDERS.

Sachet powders consist of two very distinct parts; the base and the perfuming element. In some cases these are combined by using lavender flowers, etc., as a base but the more modern powder depends upon the use of some absorbent base and liquid perfume for its effect.

The best base for sachet powder is orris root, which may be had at 8 to 10 cents a pound for the Verona and from 12 to 15 cents per pound for the Florentine.

If you desire to add other substances to this base you have the choice of powdered sandalwood or cedarwood, which should only be used in minute quantities, powdered

white rose leaves, and other aromatic flowers, woods, gums, etc. The orris alone, however, makes an ideal sachet base. If the orris is desired colored, put the powdered orris in a large mortar and add to it gradually with constant mixing enough Diamond Dye of the desired color, dissolved in water, to give the shade desired.

Spread out thin and dry thoroughly. Then use enough of this colored powder with the balance of the uncolored powder to make the whole bulk of the orris used of the desired shade. The powder should be about a 20-40, that is, not so fine as to pass through a 40 mesh sieve and none so coarse as not to pass through a 20 mesh sieve.

For a perfume use any liquid perfume in concentrated form.

The perfume is poured over the powders gradually with constant mixing in a mortar. The orris absorbs the perfume and holds it almost indefinitely. Some manufacturers use bran or saw dust for a cheap powder base, but both of these are likely to develop a disagreeable odor after standing for awhile which makes them unsuited to the purpose.

SOLID PERFUMES.

These are compounds of paraffin with various essential oils or other odorous substances. The general proportions are one-half to one dram of the perfuming oil to each ounce of paraffin.

In making these the paraffin is melted on a water bath and allowed to cool without stirring until it becomes creamy; the perfumes are then stirred in and the mass poured into molds of the desired size and shape. These molds may be made of tin and to facilitate the removal of the compound from the mold, the latter is generally brushed over with a strong solution of soap before pouring in the wax. If any trouble is experienced in removing the finished blocks from the mold, dipping in hot water will usually make it easy to

remove them. Any combination of essential oils, etc., may be used as the perfuming element; the following formulas having been extensively used:

I.

Paraffin	4 ounces
Oil of Lavender	2 drams
Oil of Bergamot	2 drams
Oil of Cloves	1 dram
Oil of Rose Geranium	½ dram
Vanillin	8 grains
Oil of Sweet Almonds	1 dram

Rub up the vanillin with the almond oil, adding the other oils, and mixing well before combining with the paraffin.

II.

Paraffin	4 ounces
Oil of Linaloe	2 drams
Heliotropine	½ dram
Oil of Bergamot	½ dram
Oil of Lemon	½ dram
Oil of Sweet Almonds	1 dram

Mix as directed for the preceeding formula.

Another variety of solid perfumes have a base of plaster of Paris saturated with the odor. These have been sold quite extensively, encased in filagree work and having a pin or ring attached so that they may be worn on the person. Put up in this way they have formed the basis of many "trust schemes" and, judging from the number of firms handling them, must have proved good sellers.

In making this class of perfumes 10 ounces of plaster of Paris is mixed with one dram of common salt and made into a cream with water. Generally some aniline color is added, this color varying with the odor of the perfume used. This aniline is dissolved in the water used in mixing up the plaster.

The perfuming oils are rubbed up with the plaster in a mortar before moistening it and when they are thoroughly mixed the water is added, the whole mixed to a cream or paste and cast in molds of the required size and shape.

For a violet perfume block use:

Ionone	1 dram
Oil of Neroli	10 drops
Oil of Rose	6 drops

Mix with the quantity of plaster specified above as directed and form into cakes.

SECTION VI

MEDICAL SPECIALTIES.

The term patent medicine as commonly applied is a misnomer, but few of the multitude of medicines now on the market being patented. In years gone by it was customary to patent any particularly meritorious medical compound which might be discovered, but as time went on the manufacturer came to realize that by doing this he was simply making his formula and process public property and that he could much better protect his own interests by registering his trademark and holding his formula a secret, thus rendering it necessary for those who would unlock the secret of his preparations to call to their aid the art of a skilled analytical chemist.

There is much which might be said both for and against proprietary medicines. On the one hand, there is no question but that many of these preparations possess a high degree of merit, that they often do cure cases of illness which have seemed to resist all other methods of treatment and that they furnish a cheaper form of medication than can be obtained from the regular practitioner; on the other hand, it must be confessed that they often do harm, both on account of the ingredients they contain not being suited to the requirements of the one taking them and because persons who really require the services of a physician sometimes refrain from calling one until their ailments have reached a very advanced stage, depending upon their favorite medicine to bring about a cure of some disease to which it is not in any way adapted and thus prolonging their suffering, and

it cannot be denied in some cases, actually inviting a fatal termination to their afflictions. It must also be admitted that certain proprietary medicines contain dangerous and harmful ingredients and last but not least that the large majority of them are claimed to accomplish results which it is manifestly impossible for them to bring about.

The weakest point of the proprietary medicine business lies in the fact that the patient is required to make his or her own diagnosis of their ailments and that the average mortal who has not had the advantages of a medical education is unable to do this intelligently is self evident to any fair minded person. While the physician sometimes makes mistakes, in all fairness it must be admitted that he is in much better position to determine the nature of any illness than one who has not made a study of the subject and that his personal contact with his patients and the resulting knowledge of their condition and requirements, enables him to select the proper form of treatment to much better advantage than would be possible to some one, no matter how competent or well educated, who has never seen the person whom he is presuming to treat.

The whole subject may be summed up very tritely in the words of a certain physician who said: "If Bill Jones has pneumonia, treat Bill Jones, not the pneumonia," which statement when analyzed means simply that the personal element is the greatest factor in any form of medical treatment. A medicine which would be well suited to a strong man suffering from some malady might not at all meet the requirements of a delicate lady afflicted with the same disease. And the difference is not one of dosage merely, as some persons are unable to bear even the smallest doses of certain medicines which exert decidedly curative effects on other persons having the same pathological symptoms.

In short, the proprietary medicine business may be said to be the most profitable and the least satisfactory, aside

from the financial part, of all forms of proprietary manufacture. The best the manufacturer can do is to adapt his medicines to the average human being leaving the rest to chance, and when we take into consideration that the "average" man or woman is a very rare individual, we cannot help feeling that chance has considerably the long end of the bargain.

Much of the reputation gained by most of the popular proprietary medicines must be attributed to the fact that human nature is prone to magnify its ailments and to consider even the most trivial departures from normal health as being very serious. This is especially true when the imagination is helped out by the average "patent medicine" literature with its voluminous lists of symptoms indicating the necessity of using Dr. Killem's Liveforever Compound or some other conoction with an equally alluring title. In fact, it would be impossible for any man with a grain of faith approximating the oft quoted "mustard seed" in size, to read these lists without considering himself afflicted with some one or more of the diseases to which they are supposed to appertain. Those instances where they have "cured when all others have failed" are due either to nature having brought the illness to a favorable termination or else the medicine happening to be exactly what the patient in his or her condition needed to accomplish the cure, and because this result has been accomplished in one instance is no real reason for believing that it would do so in the majority of similar cases.

That nature does bring about cures unaided, is an undeniable fact. Fortunately for mankind, most of the commoner forms of disease have a tendency to "run themselves out" in a comparitively short length of time. Such ailments as consumption and cancer are notable exceptions to this rule, but in these diseases there is little that medical science

can accomplish. A well known physician when asked what to take to cure a cold, replied, "take three days," this being about the length of time required for the symptoms of this affliction to abate naturally. We are all inclined to give the credit of curing any disease to the particular medicine we may be taking at the time the symptoms of the disease begin to disappear, when in fact the real curative agent may have been a medicine which we had abandoned some time previously, or even the result of purely natural processes which the medicines used did not affect in one way or the other.

I do not wish to be understood that I condemn all proprietary medicines indiscriminately. On the contrary, I believe that such preparations have a place in our present system of life and if we eliminate the disguised cocktails and narcotic laden proprietaries from the market and then put medicine advertising on the same basis adapted with other lines that the proprietary medicine business will be elevated to the rank of an honorable vocation and the "medicine man" will become what he has all these years claimed to be—a public benefactor.

If you desire to market a medicine let it be something which has genuine merit. Keep your preparation free from deleterious ingredients and do not let low cost of production tempt you to offer an inferior product. Keep away from "cure-alls" and remedies for incurable diseases. In your advertising avoid bombast and false claims, depending upon logical reason-why arguments to bring you a fair share of the trade in the territory you are working. Give the public an honest medicine and charge them a fair price for it and you will have little to regret either from the standpoint of financial results or the inner workings of your own conscience.

Remember that too much must not be expected of any medicine. Some cases of almost every disease are incurable

and where even the best physicians often fail to accomplish a cure, it cannot be logically expected that any remedy will cure every case of the ailments for which it is recommended. The formulas I offer for the various types of medical preparations have been carefully selected to meet the requirements of the majority of patients suffering from the conditions for which they are recommended, and I have scrupulously avoided giving any formulas which would be likely to produce untoward results in any case.

In the following formulas wherever the dose of a remedy is stated it must always be taken to mean the proper dose for the average adult. It is evident that in the case of delicate individuals and children the dose should be proportionately reduced. The following tables will aid you in figuring the doses for children of various ages, being the ones commonly used by physicians for that purpose.

Youngs' rule is, that taking the adult dose at unity the fraction thereof, proper for a child of given age may be found by the formula.

$$\frac{\text{Age}}{\text{Age} + 12}$$

that is, that the age of the child is to be divided by the age plus twelve, which will give a fraction representing the proper part of the adult dose to be given.

For example, at age six, the operation becomes,

$$\frac{6}{6+12} = \frac{6}{18} \text{ or } \frac{1}{3}$$

therefore a child of six years old would take one-third of the adult dose.

Cowling's rule is that the proper fraction of the adult dose for a child at any age may be found as follows:

$$\frac{\text{Age at next birthday}}{24}$$

Thus, to find the dose for a child of six years, we would add one to the age and divide by twenty-four. This gives us,

$$\frac{6+1}{24} = \frac{7}{24}.$$

which is a trifle less than one-third, the two rules producing very similar results.

Of all the proprietary medicines on the market the Sarsaparilla Compounds have the largest sale. They are put up under various names and titles, as Alteratives, Blood Cleansers, Blood Searchers, Blood Purifiers, Medical Discoveries, Resolvents, etc., but are best known and most frequently sold as "Sarsaparilla" or "Sarsaparilla Compound." Although this is probably, from a medical standpoint, the least valuable of the drugs composing the preparation, and in spite of the fact that physicians claim that the extraordinary alterative properties ascribed to this drug are in a great measure imaginary, the name has come to be, to the average unscientific person, the synonym of all things desirable in the way of a blood purifier.

This condition is largely due to the persistent advertising of Hood, Ayer and other of the large concerns putting out a medicine of this kind, who for a number of years have kept the name constantly before the public and although it is undoubtedly true that "a rose by any other name would smell as sweet" and that the same medicine under another name would prove quite as efficacious, it is very unlikely that any other name could be found which would appeal so strongly to the popular mind.

It is evident that the cost of a preparation of this kind depends principally upon its strength and by increasing the proportion of water to the other ingredients it may be reduced to almost any figure specified, but it is equally true

that there must be a limit below which the medicinal action of the preparation would cease to be apparent. Therefore, it is more to the purpose that the prospective manufacturer should concern himself with how much he can afford to pay instead of how cheap he can make his product.

In submitting the formulas herewith I have not attempted to make the cost of manufacture as low as possible, regardless of quality, but have given formulas of such a nature that a medicine of fair strength may be made from them, preferring to allow the manufacturer to reduce the strength to fit his own ideas of the profits he ought to make. However, as your profits will depend more upon the building up of a permanent trade than upon the profits from single sales, ordinary prudence would dictate that the quality should be such as to conduce to re-orders on the part of persons buying the medicine.

Two processes are open to the maker of this medicine. The first and simplest is to use the fluid extracts of the drugs instead of the drugs themselves. The other process, while undoubtedly making the cost of manufacture lower, is a more complicated one and requires the use of some apparatus in extracting the medicinal principles from the drugs. Formulas for both processes follow and I would suggest that the former be used only where the manufacture is carried on in a small way.

SARSAPARILLA COMPOUNDS.

I.

Fluid Extract Sarsaparilla (Honduras)	1	pint
Fluid Extract Yellow Dock	1	pint
Fluid Extract Stillingia	1½	ounces
Fluid Extract of Mandrake	1	ounce
Potassium Iodide	6½	drams
Iron Iodide	40	grains
Alcohol	1	pint
Sugar	6	ounces

Water sufficient to make	½ gallon

Mix the fluid extracts, add the alcohol and water, then dissolve the iodides and the sugar in the liquid by agitation.

This formula produces a concentrated product similar to the highest types of this remedy on the market. The dose is from one-half to one teaspoonful, three or four times a day. For a weaker medicine dilute with water, or better, with syrup or simple elixer to the desired degree.

Another formula which will produce a high grade product is as follows:

II.

Fluid Extract Sarsaparilla	1 pint
Fluid Extract Stillingia	1 pint
Fluid Extract Yellow Dock	1 pint
Podyphyllin	45 grains
Water	½ gallon
Simple Elixir	½ gallon
Alcohol	½ gallon
Potasium Iodide	2 ounces

Mix the fluids and dissolve the podyphyllin and potassium iodide in the mixture; then filter.

Dosage, same as No. 1.

As in the case of the preceeding formula this product may be diluted to any desired degree with water, syrup or simple elixer, should it be deemed desirable to produce a cheaper preparation.

In manufacturing this remedy directly from the roots, etc., a water bath percolator is required. In its simplest form this apparatus consists of a tin cylinder open at the top and having a funnel shaped outlet at the bottom. This cylinder is surrounded with another cylinder or jacket, through the bottom of which the stem of the percolator projects to admit of collecting the percolate. In use, this outer cylinder or jacket is filled with water, which is changed

from time to time to keep it at the desired temperature. In manufacturing on a large scale, the apparatus is generally made from iron with the interior of the percolator tinned or enamelled, and means are provided for furnishing a constant supply of steam or hot water in the outer chamber so as to render it easy to maintain any desired temperature as long as may be desired.

III.

Mexican or Honduras Sarsaparilla	1 pound
Stilingia	1 pound
Burdock Root	6 ounces
Blue Flag Root	3 ounces
Mandrake Root	3 ounces
Senna Leaves	3 ounces
Prickly Ash Bark	1½ ounces
Potasium Iodide	2 ounces
Dilute Alcohol (50%)	1 gallon
Sugar	10 pounds
Water sufficient to make	2 gallons

The drugs should be ground for percolation, and may be purchased in this form from any good wholesale drug house. Mix the drugs intimately and moisten them with one-half gallon of the dilute alcohol. Macerate for twenty-four hours, then pack moderately tight, in the percolator and add the remainder of the dilute alcohol. Stand in a warm place for twenty-four hours longer; then heat moderately for about an hour. The bottom of the percolator may now be opened, and the percolation commenced. It should be percolated rather slowly and when the liquid ceases to drip water should be poured over the drugs until one and one-half gallons of percolate have been collected. The heat should be maintained in the outer chamber during the entire process. Dissolve the potassium iodide in the percolate and after standing for twenty-four hours,

filter, adding sufficient water through the filter to make two gallons. Dissolve the sugar in the liquid and bottle.

Generally some flavoring material, as various essential oils, are added to the mixture to improve the taste. For this purpose any desired proportions of oil of wintergreen or sassafras, or a combination of the two, may be used. These oils should be dissolved in alcohol and added to the liquid, after filtering, in sufficient quantities to give the desired flavor. This flavoring material may also be added to either of the preceeding formulas, if desired.

The cost of these preparations will vary with the quantities in which the materials are purchased, large lots costing less proportionately than smaller ones. On account of market fluctuations in drugs and chemicals of all kinds it would be of no practical value to give the cost of making up the medicines. This information may be easily obtained by consulting up-to-date price lists or asking your wholesale dealer for prices on the materials required.

It is quite probable that glycerin might be used in these formulas to replace at least a portion of the alcohol. There is a growing tendency among manufacturers of proprietary medicines to use as little alcohol as possible in their preparations, this being occasioned by the lower cost of glycerin and partly by the agitation against the use of alcohol in any form in medical specialties which has recently assumed much importance.

While on the subject of alterative remedies it may not be out of place to give the published formulas of some of the better known proprietaries in this line. The various drug and medical journals have published considerable information upon this subject during the past few years, the formulas herewith being drawn from these sources as indicated.

CUTICURA RESOLVENT.

This preparation is said to be,

Aloes Socotrine	1 dram

Rhubarb, powdered	1 dram
Potassium Iodide	36 grains
Whiskey	1 pint

Macerate over night and filter.

—*St. Louis Druggist.*

GREEN'S AUGUST FLOWER.

The following is said to make a preparation similar:

Rhubarb	360 grains
Golden Seal	90 grains
Cape Aloes	16 grains
Peppermint Leaves	120 grains
Carbonate of Potassium	120 grains
Capsicum	5 grains
Sugar	5 ounces
Alcohol	3 ounces
Water	10 ounces
Essence of Peppermint	20 minims

Powder the drugs and macerate with the mixed alcohol and water for seven days; filter and add enough diluted alcohol to make the product measure one pint.

—*New Idea.*

KICKAPOO INDIAN SAGWA.

The following formula is said to make a preparation which is hard to distinguish from the proprietary article:

Capsicum	1 ounce
Ground Rhubarb	4 ounces
Aloes	4 ounces
Ground Mandrake Root	8 ounces
Gum Guiacum	1 pound
Cubebs crushed	1 pound
Licorice ground	1½ pounds
Sal Soda	20 ounces
Alcohol	6½ gallons
Water	36 gallons

Macerate all except the soda in dilute alcohol for twenty-four hours, then percolate and add remainder of water and soda.

RUSSELL'S BOTANIC KING.

Russell's Botanic King, Chester, Pa., consists, acocrding to the label, of a combination of pure extracts of dandelion, mandrake, buchu, queen's root, Puruvian bark, etc., and the "et cetera" we think is cape aloes, judging from the odor and general appearance, and this constitutes probably the bulk of the mixture. It is a coarse, brownish-black powder, put up in a turned wood box (well caked together in this example), the box being two inches in diameter by one and one-eighth inches deep, bearing pink label on top and around the edge. The Botanic King is stated to be a medicine of rare excellence, and the best one made for the liver, stomach, kidneys, bowels and blood. The directions are that the contents of the box shall be dissolved in a quart of water, and the dose for an adult a wineglassful, night and morning; and for a child a teaspoonful, night and morning. From the superficial examination we have made, we should judge that it consists, as Dr. Russell states on the label, of a mixture of powdered extracts of dandelion, buchu, yellow dock and Peruvian bark, each ten parts; aloes fifty parts.

—*New Idea.*

SWIFT'S SYPHILLITIC SPECIFIC (S. S. S.).

Speaking of this preparation the Druggist's Circular says: "We do not know the composition of this nostrum." They refer to a note on the subject appearing in a previous issue, in which Dr. Cull of Camilla, Ga., is quoted as having said that he had used the mixture before Swift was born, and that it had always proven efficacious. His formula which was rather crude and indefinite as to quantities, was given. Put into pharmaceutical shape it is about as follows:

Fluid Extract of Fringe Tree Bark 1 ounce

Fluid Extract of Prickly Ash Bark	4 drams
Fluid Extract of White Sumach	2 drams
Fluid Extract of Red Sumach	2 drams
Fluid Extract of Sarsaparilla	6 drams
Copper Sulphate	8 grains
Pyroligneous Acid	20 drops
Alcohol	4 ounces
Water sufficient to make	16 ounces

Another formula which is given as being similar to this preparation calls for the use of stillingia, poke root, sarsaparilla, nitrate of potash, a small quantity of iron and sufficient alcohol for its preservation.

Still another formula for this same preparation was printed some years ago in The Medical Brief. In this instance it is prepared directly from the crude materials. The formula follows:

Old Man's Gray Beard Root (Chionanthus Virginica)	1 bushel
Prickly Ash Root	16 ounces
White Sumac Root	8 ounces
Red Sumac Root	8 ounces
Sarsaparilla Root	10 ounces
Sulphate of Copper	8 drams

Bruise the gray-beard and sumac roots and put them with the sarsaparilla into an iron pot sufficient to hold eight gallons of water, or cover the roots completely with the water. Cover the pot with pine tops and boil slowly until the liquid assumes the color of ink. Strain while warm, add the sulphate of copper and good Holland gin sufficient to prevent fermentation.

No mention is made, in the accompanying directions, of the prickly ash root, but it is assumed that it is to be infused with the other drugs.

Several of the most prominent manufacturers of proprietary medicines have made public their formulas, at least

so far as ingredients go. While this information has been widely disseminated in their advertising literature, it may prove interesting to have it here for convenient reference.

AYER'S SARSAPARILLA.

According to the formula given out by the manufacturers of this remedy, each fluid ounce represents:

Sarsaparilla Root	10 grains
Yellow Dock Root	8 grains
Licorice Root	8 grains
Buckthorn Bark	4 grains
Burdock Root	3 grains
Senna Leaves	2 grains
Black Cohosh Root	2 grains
Stillingia Root	4 grains
Poke Root	1 grain
Cinchona Red Bark	2 grains
Potassium Iodide	4 grains

Solvent—Alcohol, 10½ minims to each fluid dram; glycerin, syrup, water.

HOOD'S SARSAPARILLA.

According to the information published by the manufacturers of this remedy, it contains sarsaparilla, yellow dock, pipsissewa, uva ursa, juniper berries, mandrake and dandelion. No information is given as to the quantities used.

PERUNA.

According to the advertising matter of the manufacturers of this remedy, it contains, cubebs, hydrastis canendensis, corydalis formosa, collinsonia, cedron seed, ginger, senna, glycerin and a very small proportion of the oil of columba. The label states that it contains 18% of alcohol by volume. The proportion of the other ingredients is not stated.

DR. PIERCE'S GOLDEN MEDICAL DISCOVERY.

According to the information sent out by the World's Dispensary Medical Association, proprietors of Dr. Pierce's medicines, the Golden Medical Discovery is made from:

Golden Seal Root (Hydrastis Canandensis)
Queen's Root (Stillingia Sylvatica)
Stone Root (Collinsonia Canandensis)
Bleck Cherry Bark (Prunus Virginica)
Bloodroot (Sanguinaria Canandensis)
Mandrake Root (Podyphyllin Peltatum)
Chemically Pure Glycerin
Pure Water.
Borate of Soda, a very small quantity (about one grain to the dose of the "Discovery.")

No information is given as to the proportions of the different ingredients or the manner of preparing the medicine.

Remedies of this kind are generally put up in twelve ounce, heavily panelled bottles. Such bottles appear considerably more capacious than they really are, being not far from the size of a regulation, plain, sixteen ounce bottle. In the matter of label and wrapper for this product, you have only to observe the style generally followed by the large manufacturers of remedies of this class to get a good idea of the proper matter to appear thereon. The dosage of the medicine made from any of the formulas herewith will be practically the same as that of the better class of similar products on the market, i. e., one to two teaspoonfuls three or four times a day.

During the past few years various "Sarsaparillas" have appeared on the market, a twelve ounce bottle of which sells at retail for thirty-five cents. Judging from the amount of business done by at least one firm making this their leader, there would seem to be a considerable demand for such a product. However, it should be taken into consideration that these preparations are not offered as a cheap medicine,

but rather as a high grade remedy selling regularly at one dollar, the special price being made "for advertising purposes only." It appears that this is the one factor which has contributed most largely to the success of such preparations.

It does not require any far fetched reasoning to see that a medicine made from any of the formulas I have given could not be profitably sold at a figure which would permit of the retailer re-selling it at thirty-five cents and still allow him a profit, unless we reduce its strength considerably by the addition of water. The product of these formulas, as given, is a high grade product which will compare favorably with the best sarsaparilla compounds on the market, and in proportion as we reduce its cost by the addition of any diluting material, we lower its medicinal value.

While I do not assume to know the composition of the cheaper class of sarsaparilla compounds now on the market, it is self evident that some cheaper materials are used in the production of these preparations than those mentioned in the formulas which I have given above, or else the solvents used are greatly in excess of the proportions given in these formulas.

In casting about for some material which can be used in combination with the sarsaparilla in the production of an alterative and tonic remedy, gentian would seem to recommend itself for the purpose to a greater degree than most other drugs of equal cost. The U. S. Dispensatory ascribes to this drug tonic properties and a taste which is bitter without being astringent, and states further that it excites the appetite and invigorates the digestion. These properties would seem to recommend its use in connection with sarsaparilla and other alteratives in the production of an all-round tonic and blood purifier. It is a comparatively cheap material for the purpose, the dried root being listed at about twelve cents per pound.

Another substance which is often used in the cheaper class of medicines is aloes. Of this, there are several varieties, the best being Socotrine aloes, which comes into the market in the form of small pieces of a yellowish brown color, this varying with the method of preparing the drug. It is, in fact, the inspissated juice of a plant growing in great abundance in the Island of Socotra and it is claimed the plant growing in Eastern Africa and in Arabia is the same in nature as the true Socotrine variety. It possesses a peculiar not unpleasant odor and an intensely bitter taste, this latter property serving to impart apparent strength to any mixture into which it enters. Aloes possesses a cathartic action, producing this effect principally in its action on the lining of the large intestine.

This drug enters largely into many of the so-called herb remedies sold in powder and tablet form and may be readily detected in such preparations by its characteristic odor and persistent bitter taste. Combined with whiskey or brandy it furnishes a cathartic which was formerly very popular in this country under the name of "picra" or "pikery" and it also is utilized in the manufacture of most proprietary cathartic pills and bitters. In small doses, it exerts a tonic action on the digestive organs in addition to the well known laxative effect.

It will be readily seen therefore that this drug possesses other qualities besides cheapness, which recommend it as an ingredient in medicines designed to purify the blood, improve the digestion, relieve constipation and give general tone to the system.

By making use of one or both of these drugs, it will be possible to produce a remedy which will give general satisfaction at a cost considerably below that of the formulas given above.

As to the proportions of these ingredients to be used, there is considerable latitude allowed the manufacturer.

The average dose of gentian is the equivalent of from ten to forty grains of the powdered drug, which corresponds to ten to forty minims of the fluid extract; two to four grains of the solid extract, or one to two fluid drams of the compound infusion of gentian. (Infusum Gentiana Compositum. British Pharmacopia.) The dose of aloes is the equivalent of one to two grains of the powdered drug as a mild laxative and up to ten grains where a decided cathartic action is desired. It has a tendency to gripe and is, therefore, generally combined with other substances as capsicum or ginger, which diminish this tendency. By referring to the formulas above in which this drug apears the usual percentage of capsicum or ginger used with given quantities of aloes may be determined.

In employing gentian it may be used as a fluid extract or the drug itself may be percolated with the other materials in the preparation of the medicine. In the case of aloes, a solution of the drug in alcohol is the most convenient form to use. Aloin, which is the active principal of aloes, obtained by extracting with solvents and then evaporating to dryness, may be utilized instead of the drug itself if preferred. In using this it must be kept in mind that it is a much more powerful remedy than the drug from which it is prepared, the dose of aloin being one-eighth to one-fourth grain for a laxative and from one-half to two grains as an active cathartic.

In the formulas submitted the percentage of alcohol is somewhat higher than in most of the proprietary remedies now being sold. It may be reduced if desired, substituting water, or a mixture of water and glycerin for any portion of the alcohol omitted. It should be remembered that from 12 to 20% per cent of alcohol is necessary to prevent fermentation except in preparations where a large percentage of glycerin is used or some preservative, as benzoate of soda, employed.

While on this subject I wish to state that there is no other class of remedies in the whole proprietary field which give as good satisfaction generally as these which exert a laxative and tonic effect. Probably there is no other trouble so prevalent among the public generally as constipation with its long train of attendant evils, and anything which will relieve this condition, even though it may be only temporarily, will cause an immediate and noticeable improvement in the symptoms which invariably accompany the disease. This is the great secret of the success of the numerous herb teas and similar preparations now on the market. Taken as directed, these remedies thoroughly evacuate the digestive tract and while it is doubtless true that the indiscriminate use of cathartic medicines might prove injurious in certain cases, the fact remains that most persons would not only feel better but be better in fact for an occasional dose of some good laxative medicine.

Of this class of medicines there is a very wide variety, including practically every form of pharmaceutical preparation, such as tablets, pills, liquids, powders, etc. The most popular forms are pills or tablets, the so-called candy cathartics and the herb remedies in dry form.

In the way of a cathartic pill there is nothing better than the Compound Cathartic of the U. S. Pharmacopia. Many of the proprietary pills on the market are simply these put up under a trade name and a special style of package. These pills may be had from any pharmaceutical manufacturing concern at a very low price, and put up in small boxes or bottles, make a profitable addition to almost any line of remedies.

A considerable number of so-called herb tablets are now on the market. These for the most part make use of aloes as the active ingredient, using from one to two grains of the powdered drug in combination with a little capsicum, licorice, gentian, etc. Some of these contain a small quantity

of buchu which is used for its effect on the kidneys. Such a tablet can be had, made up, from any good pharmaceutical manufacturing concern at a price ranging from fifty to seventy-five cents per thousand, according to quantity ordered, and even a lower price might be obtained where they are purchased in very large lots. A good combination of this kind would be:

Powdered Socotrine Aloes	150 grains
Powdered Rhubarb	150 grains
Powdered Capsicum	50 grains
Extract Licorice	100 grains
Extract Gentian	75 grains

Mix and divide into 100 tablets.

I have already referred to the so-called candy cathartics. These are very popular owing to their pleasant taste and equally pleasant effect. Plenty of formulas are available which will produce a good remedy of this kind, the following having been found entirely satisfactory:

I.

Extract of Cascara	200 grains
Extract of Senna	200 grains
Powdered Licorice	20 drams
Sugar	400 grains
Oil of Anise	150 minims
Oil of Wintergreen	150 minims
Potassium Bitartrate	50 ounces
Powdered Jalap	50 ounces
Confection of Senna	100 ounces

Make into a mass and cut into lozenges of twenty or thirty grains each.

It is better to have these made either by a pharmaceutical manufacturing concern or a manufacturing confectioner, however, they may be made up by hand in small lots without a great deal of trouble. In making the mass, syrup of ginger is commonly used to moisten the materials if found

too hard to work easily. The mixture is kneaded into a smooth mass, rolled out to the desired thickness and stamped out into lozenges with a tin cutter.

II.

Powdered Senna	10	drams
Powdered Jalap	10	drams
Oil of Anise	15	minims
Oil of Lemon	15	minims
Sugar	10	drams
Tamarind Paste	7½	ounces

Form into a mass and make 120 lozenges.

III.

Tamarind Pulp	200	parts
Powdered Senna	330	parts
Mucilage of Acacia	70	parts
Oil of Lemon	1	part
Oil of Anise	1	part
Sugar	600	parts

Mix to form a mass and make into lozenges weighing 20 to 30 grains each.

IV.

Compress Compound Licorice Powder, U. S. P., into tablets of 20 grains each. These may be coated with chocolate if desired.

An almost endless variety of formulas for herb remedies have been proposed from time to time, but for the most part, these have varied only in unimportant details, either senna or aloes or a combination of these drugs forming the active portion of practically all of them.

As a rule aloes is objectionable in such a preparation on account of its intensely bitter taste, which it is almost impossible to disguise in a remedy of this kind. Senna is free from this objection and is a most useful ingredient in any preparation of this nature. Its action is effective and quite rapid and when combined with the proper corrective agents

does not cause griping. The following formulas have been thoroughly tested, both those with and without aloes being given, so as to meet all requirements:

I.

Powdered Gentian	1 pound
Powdered Rhubarb	4 ounces
Powdered Cinnamon	2 ounces
Powdered Aloes	4 ounces
Powdered Ginger	2 ounces
Sodium Bicarbonate	2 ounces
Sugar	1 pound

Mix well.

This is usually put up in one ounce boxes or envelopes, retailing at 25 cents.

Directions for use are: Mix teaspoonful of the powder with a half a glass of water and take at one dose. The dose may be increased or diminished to produce the desired laxative effect.

II.

Senna Leaves	3 pounds
Licorice Root	4 ounces
Dog Grass	6 ounces
Corriander Seed	½ ounce
Fennel Seed	½ ounce
Anise Seed	1 ounce

Cut in small pieces and mix well.

Directions for use: Put a teaspoonful of the herbs in a cup of boiling water and allow to stand until cool enough to drink. Take at one dose. The best results are usually obtained by taking just before retiring at night.

Some of the proprietary remedies on the market claim to contain Oregon grape root. If desired three ounces of this may be added to the above formula.

III.

Buckthorn Bark	1 pound

Dandelion Root	1 pound
Senna Leaves	1 pound
Licorice Root	4 ounces
Sweet Flag Root	2 ounces
Corriander Seed	2 ounces
Anise Seed	2 ounces

Cut the herbs in small pieces, bruise the seeds well and mix thoroughly. This is usually sold in two ounce packages at 25 cents.

Directions for use: Same as No. 2.

A popular remedy is a so-called Blood Purifying Tea, made from the following formula:

Burdock Root	1 pound
Sassafras Bark	4 ounces
Blue Flag Root	1 ounce
Dandelion Root	12 ounces
Sarsaparilla Root	1 pound
Wild Cherry Bark	4 ounces
Yellow Dock Root	4 ounces

Cut or granulate the ingredients and mix well. Put up in packages of about two ounces to retail at 25 cents. One package makes, when prepared according to directions, a quart of medicine.

Directions: Steep the contents of the package in a quart of water for two hours, heating gently during the time but not boiling. Add sufficient water to make one and one-half pints of the extract when strained off. Add to this extract one pint of alcohol and four ounces of sugar. The dose is a wineglassful before meals and at bedtime.

The only use of the alcohol is to prevent fermentation and in case its use is objectionable it will only be necessary to make up the medicine in small quantities, enough for one or two days, at a time, keeping in a cool place until used.

Many people feel the need of a blood purifier during the spring and early summer and such a remedy as this ought

to prove a ready seller during that season. The ingredients are all well and favorably known and if a list of same are printed on the carton or wrapper it will serve to inspire confidence in the medicine on the part of the public.

Another class of laxative remedies which are very popular are manufactured from figs or prunes with sufficient senna or cascara to give the laxative effect.

Some time ago, The Practical Druggist published the following under the name of Magoffin's Prunella Laxative. This formula produces an elegant preparation which may be sold at a good profit:

Prunes, choice	2 pounds
White Sugar	5 pounds
Fluid Extract Cascara, aromatic	1 pint
Aqueous Extract Senna	1 pint
Spirit Lemon	4 ounces
Saccharin	1 dram
Water enough to make	12 pints

Boil the prunes in five pints of water for fifteen minutes, strain and add the remaining ingredients. Dose as an active cathartic for an adult, two teaspoonfuls, repeated in four hours if needed; for a child in proportion. In smaller doses it is an effective laxative.

FIG LAXATIVE.

I.

Senna Leaves	14	ounces
Coriander Seed	6	ounces
Figs	24	ounces
Tamarinds	18	ounces
Cassia Pulp	18	ounces
Prunes	12	ounces
Extract of Licorice	1½	ounces
Essence of Peppermint	1½	ounces
Water	1	gallon
Brown Sugar	10	pounds

Crush the first six ingredients small, boil gently for half an hour, then cool and add the other ingredients, stirring until the sugar is dissolved.

The dose as a purgative varies from a tablespoonful for an adult to a teaspoonful for a child. As a laxative the dose may be reduced.

II.

FIG AND CASCARA LAXATIVE.

Figs	1	pound
Tasteless Extract Cascara	10	ounces
Oil of Anise	10	drops
Oil of Cloves	10	drops
Sugar	2¼	pounds
Water	½	gallon

Cut the figs small, infuse in three pints of boiling water for half an hour, press and strain. Dissolve the sugar in the liquid by aid of gentle heat and when cold add the remaining ingredients, with sufficient water to make one-half gallon of the finished product. It is advisable to dissolve the oils in alcohol before adding to the other ingredients, although this is not absolutely necessary.

Dose—Same as recommended for the Fig Laxative above.

Another form of laxative remedy which is quite popular in many sections is known as Fruit Salt. These vary considerably in composition, the following formulas being typical.

I.

Carbonate of Soda	2 ounces
Tartaric Acid	2 ounces
Cream of Tartar	2 ounces
Epsom Salts	2 ounces
Citrate of Magnesia	2 ounces

Dry separately at a moderate temperature in an oven. Mix by passing through a sieve several times.

Preparations of this nature must be kept in glass bottles, provided with well fitting corks and kept perfectly dry. The corks should be dipped in paraffin before using, a piece of oiled paper being put over the cork before inserting in the bottle. After corking, dip the top of the bottle in melted paraffin.

Directions: A heaping teaspoonful in a glass of water, drink while effervescing. This is an excellent remedy for indigestion and a pleasant aperient drink. It is especially recommended for undue acidity of the stomach and for the relief of seasickness.

II.

Rochelle Salts	4 ounces
Cream of Tartar	2 ounces
Tartaric Acid	4 ounces
Bicarbonate of Soda	4 ounces
White Sugar	8 ounces

Mix and use as directed for No. 1.

III.

Bicarbonate of Soda	16½ ounces
Tartaic Acid	15 ounces
Rochelle Salts	11 ounces

Mix and use as directed for No. 1.

LINIMENTS.

Liniments are alcoholic or oily solutions of various substances, particularly oils and gums, intended for external use. According to their composition they may be classified as stimulating, irritating, anodyne, etc.

The popular fancy in this class of preparations has undergone considerable change in the past few years and to-day the semi-greaseless liniments made with alcohol, gasoline or kerosene basis are preferred to the heavier bodied oil liniments which were formerly so popular.

Another class of liniments which were exceedingly popular a few years ago, but which are now seldom met with, are made with a mixture of various oils, emulsified or partially saponified by the addition of ammonia or other alkali. These liniments are worthy of more than passing attention and I offer several formulas for this class which I consider of exceptional value. Chief among these is the White Oil Liniment, which is a very valuable preparation, both from the standpoint of medicinal action and selling qualities.

Much of the benefit derived from the use of any liniment must be ascribed to the rubbing or massaging of the skin attending its application. Indeed, a rather prominent physician is authority for the statement that water is as good a liniment as anything else, providing proper attention is given to its application. This statement, however, is rather too broad, as there can be no question but that many liniments exert a direct therapeutic action, apart from any effects which may result from the friction of the skin which is used in applying them.

In no line of proprietary preparations is there a more marked similarity of the various representatives of the class than with liniments. Knowing the ingredients commonly used, there is no reason why anyone of ordinary ability cannot devise a good formula and a few dollars' worth of materials and two or three days intelligent experimenting will enable the average mixer to closely imitate practically any of the proprietary liniments, both as regards appearance and action.

In making a liniment it is only necessary to select the base or vehicle and then combine it with such other ingredients as may be known to possess virtues of the kind desired in the preparation. The formulas given herewith are only suggestive and while any of them will produce a good liniment, they may be modified to meet any particular conditions or ideas. These formulas vary considerably in

cost of production and any of them may be put up more cheaply by reducing the quantity of the more expensive ingredients or substituting cheaper materials in their place. It must be borne in mind, however, that a reasonable percentage of the principal therapeutic materials must be used in order to produce a good preparation.

I.

Raw Linseed Oil	1 gallon
Camphor	4 ounces
Oil of Sassafres	2 ounces
Oil of Hemlock	2 ounces
Oil of Organium	2 ounces
Oil of Cedar	2 ounces

Mix all the oils except the linseed, add the camphor in small pieces, stirring until dissolved. Then add this mixture to the linseed oil gradually, with constant stirring.

This makes a good general purpose oil liniment:

II

Oil of Sassafras	2 ounces
Oil of Hemlock	1 ounce
Oil of Turpentine	1 ounce
Capsicum, powdered	1 ounce
Camphor	1 ounce
Alcohol	½ gallon

Macerate the capsicum in the alcohol for two or three days, strain and dissolve the camphor in the liquid. Then add the remainder of the oils in small portions, mixing well after each addition.

Preparations similar to these are often sold under the name of Rheumatic Liniment. In use they should be well rubbed into the skin using plenty of heat during the process. If the part is very painful cover with flannel.

Wherever alcohol is directed to be used in a liniment, pure grain alcohol (95%) is intended. The existing drug laws prohibit the use of wood or denatured alcohol in med-

icinal preparations, either for external or internal use, and this applies to veterinary remedies as well as for those intended for use by the human family.

III.

This formula is selected from the Bulletin of Pharmacy as representing the highest type of an internal and external liniment. Such preparations are generally put up in small bottles retailing at twenty-five cents, and if well advertised will be found excellent sellers.

Oil of Sesame	1	pint
Oil of Peppermint	1½	ounces
Oil of Wintergreen	2	ounces
Oil of Spearmint	10	minims
Oil of Sassafras	3	ounces
Oil of Cassia	20	minims
Oil of Eucalyptus	10	minims
Menthol	30	grains
Chlorophyll	30	grains

Mix the oils together with the exception of the sesame. In four ounces of the oil of sesame dissolve the chlorophyll by the aid of heat; when dissolved, remove the liquid from the fire and dissolve in it the menthol; then mix all together and filter if necessary.

The coloring matter can be omitted if desired or a harmless red color can be substituted. This is often sold under the name of "Green Oil" or "Red Oil,' according to the color used.

Externally, this is used as other liniments. For internal use the dose is from ten to thirty drops.

IV.

Oil of Organium	12	ounces
Oil of Hemlock	4	ounces
Oil of Cedar	2	ounces
Balsam of Fir	2	ounces
Oil of Spearmint	2	ounces

Oil of Sassafras	2 ounces
Oil of Wintergreen	2 ounces
Turpentine	2 ounces
Sulphuric Ether	2 ounces
Alcohol	2 gallons

Mix the oils, etc., with the alcohol, shaking until dissolved.

V.

Gasoline	1 gallon
Oil of Wintergreen	2 ounces
Oil of Sassafras	1 ounce
Oil of Hemlock	1 ounce
Oil of Mustard (true)	4 drams
Turpentine	1 pint

Macerate the capsicum with the gasoline for two or three days, strain or filter and add the oils gradually, shaking well after each addition; let stand for a day or two and filter. If desired a red color may be imparted to this mixture by macerating an ounce of alkanet root in the gasoline until the desired color is obtained.

In using liniments containing gasoline as a base, care must be exercised not to bring them too near the fire or a lighted lamp. Attention should be called to this point on the label.

VI.

Kerosene	1 gallon
Oil of Organium	1 pint
Turpentine	2 pints
Oil of Sassafras	4 ounces
Oil of Hemlock	4 ounces
Linseed Oil (raw)	1 pint
Capsicum in powder	3 ounces

Macerate the capsicum with the kerosene for several days, then filter. Add the linseed oil and turpentine, mix-

ing well; then the remaining oils, shaking well after each addition.

This may be colored as directed for No. 5 if desired.

VII.

Various formulas are extant for the so-called White Oil Liniments but the trouble with most of them is that they separate on standing for a few days. The formulas given below will, if properly handled, produce a preparation which is free from this objection and one which will give good satisfaction.

Powdered Castile Soap	4 ounces
Carbonate of Ammonia	4 ounces
Camphor	4 ounces
Turpentine	4 ounces
Ammonia Water	4 ounces
Water sufficient to make	½ gallon

Dissolve the soap and carbonate of ammonia in two pints of water by means of heat and add the ammonia water to the solution. Rub up the camphor with the turpentine, and add the warm soap solution gradually with constant stirring until a uniform creamy mass is formed. Lastly add the remainder of the water, in divided portions, mixing well after each addition.

VIII.

The Chemist and Druggist, a prominent English Drug Journal, gives the following improved method of making a turpentine liniment which I have found to be very satisfactory:

Solution of Potash B. P.	3 fluidounces
Oleic Acid	7 fluiddrams
Oil of Turpentine	13 fluidounces
Camphor	1 ounce
Distilled Water enough to make	1 pint

Mix the solution of potash with an equal quantity of water, in a bottle, add the oleic acid previously mixed with

three ounces of oil of turpentine and mix by gently inclining the bottle up and down, avoiding shaking which at this point would cause excessive frothing. An emulsion is at once formed to which the remaining oil of turpentine, with the camphor dissolved in it, may be added in quantities of one ounce or more at a time, with gentle shaking after each addition. Finally, enough distilled water is added to produce a pint. The result is a thick creamy emulsion, whiter than the usual product, and containing the pharmacopœial percentage of active constituents.

In making this up it should be kept in mind that the British pint contains 20 ounces instead of 16 as does ours.

The Solution of Potash B. P. (British Pharmacopia) is made 6.22 grammes of caustic potash in 100 cubic centimeters of water. For practical use 1½ drams of potash in 3 ounces of water will answer every purpose.

SALVES AND OINTMENTS.

These preparations are closely related to liniments, differing from them chiefly in consistence. They are of two classes, i. e., those intended to produce local effects only and those which, through absorption, are designed to produce systemic effect. A good example of the latter class is mercurial ointment, which is largely used as a means of introducing mercury into the system.

As in the case of liniments, this class of preparations has undergone many changes and the simple cerate, composed of lard and wax, which formerly formed the base of practically all the ointments on the market, has largely given way to petrolatum, which by reason of its freedom from rancidity is greatly to be preferred as an ointment base.

Although the demand for this class of preparations has fallen off largely, there is still a good opening for a first class ointment. While such a product could hardly be considered of sufficient moment to justify attempting to build

up a paying business on this alone, it forms a good side line to almost any line of medical specialties.

Ointments differ greatly in composition, according to the purpose for which they are intended. Thus for an application to indolent ulcers, they are generally made irritating or strongly stimulant in order to increase the circulation in the part being treated, while for the treatment of cuts, wounds, slight abrasions or eruptions of the skin, etc., a non-irritating antiseptic preparation would be preferable.

Everyone is familiar with the names Holloway's, Swayne's and Mayer's ointment, while Trask's Magnetic Ointment, Bucklen's Arnica Salve and the celebrated Cuticura are household words throughout the length and breadth of this country, and there is no reason why similar products if properly advertised should not prove equally as good money makers. There is little mystery in the making of this class of specialties and it does not require a deep knowledge of medicine to produce a preparation which will prove entirely satisfactory in use.

As stated above, the base of nearly all modern salves is petrolatum and, indeed, more than one of the highly advertised proprietary products of this nature consist of this substance with the addition of something to disguise the smell and possibly a little carbolic acid or something of a like nature to give it a slight antiseptic action. Mercury in its various forms, was formerly quite popular as an ingredient in ointments and even at this time some of the "purely vegetable" preparations contain enough of this drug that a small portion of the ointment placed on a copper coin and a drop of nitric acid added will suffice to deposit a silvery coating upon the metal.

While in ointments for certain purposes, mercury might be considered a valuable addition, generally speaking it is objectionable. There is no necessity for using such ingredients as there is a wide field to select from in the way of

materials which are entirely harmless and which possess therapeutic value to a marked degree.

Of the various essential oils which find use in the production of salves and ointments, eucalyptus ought to be given first place. It is a good antiseptic, possesses a pleasant odor and for healing purposes has no superior. This oil is comparitively cheap and could be utilized to advantage in almost any preparation of this kind.

Another substance which possesses much value is thymol. This comes in crystals which melt at a comparitively low temperature so that if added to the base before it is entirely cooled there is no trouble in combining it. This ingredient should be used sparingly as it is quite powerful, although entirely harmless.

Many formulas will be found which call for the use of simple cerate as a base. While this can in most cases be replaced with petrolatum it is desirable to know the process of making it. The U. S. Pharmacopia gives the following method for its preparation:

White Wax	300 grams or 3 ounces
White Petrolatum	200 grams or 2 ounces
Benzoinated Lard	500 grams or 5 ounces

The white wax to be melted, the white petrolatum added and then the benzoinated lard, continuing the heat until the mixture is liquefied, then stirring constantly until it congeals.

For use in southern latitudes and during the heated season in other localities 50 grams or one ounce of the benzoinated lard may be replaced by an equal quantity of white wax.

It should be noted that the quantities given in commercial weight at the right of the formula are not intended to be the equivalent of the metric weight directed, but give us the materials in the same proportion as when the metric weights are used.

The directions accompanying the above formula furnish a good example of a rule which should be uniformly followed in combining substances having different melting points, i. e., the most refractory are melted first and others added in the order of the melting points. The object of this is to prevent overheating the materials possessing the lower melting points while applying sufficient heat to melt the more refractory substances.

We often hear of ointments described as "purely vegetable" but in practice it is next to impossible to produce a product of this kind which will fully comply with the terms of this statement. Practically the only available vegetable base is cocoa butter, which is too hard when cold to be used satisfactorily. Aside from this the cost is considerably higher than that of many other materials which possess greater value for the purpose and there is nothing to recommend its use except that it may be called a vegetable product. If you should decide to make use of this ingredient, the addition of a little olive or sweet almond oil will serve to reduce it to a consistence that will admit of its being easily applied. One other objection to the use of this material is its low melting point (practically that of the human body) and anyone who attempted to carry a box of salve made with a cocoa butter base in his pocket would be likely to find it liquefied and spread pretty freely over his garments.

A very popular "carbolic salve" has the following composition:

Crystal Carbolic Acid	40	grains
Boric Acid	2	drams
Petrolatum	1	pound
Oil of Bergamot	1½	drams

Mix the two acids in a mortar and add the melted petrolatum gradually, rubbing until thoroughly mixed; add the oil of bergamot and mix well through the mass.

Should you desire a firmer base, the addition of a small

quantity of paraffin to the petrolatum will give the desired body. The proportion of paraffin may be varied to give a base of any desired consistence.

The oil of bergamot is simply for scenting the product and may be replaced with any other suitable essential oil if preferred. Oil of rose geranium in small quantities serves well to cover the odor of the phenol (carbolic acid) as does oil of cinnamon or verbena (lemongrass.)

Should it be deemed advisable to give a green color to the salve, the addition of sufficient chlorophyll to give the shade desired will be found satisfactory. For a red color, infuse crushed alkanet root in the melted petrolatum until its color is extracted; then strain.

The older types of carbolic ointments were made as follows:

Simple Cerate	1 pound
Carbolic Acid	1 ounce

Melt the cerate and combine with the carbolic acid while cooling.

The simple cerate in the above formula may be advantageously replaced with the following:

Petrolatum	15 ounces
White Wax or Paraffin	1 ounce

Mix by aid of heat.

Should you desire to produce an arnicated carbolic salve, add to the mixture one ounce of arnica.

The formula below produces what may be well termed an antiseptic healing salve. It is a good general purpose ointment.

Oil of Eucalyptus	2 drams
Crystal Carbolic Acid	2 drams
Oil of Cedar	2 drams
Oil of Bergamot	2 drams
Salicylic Acid	1 dram

Boric Acid	2 drams
Yellow Wax	1 ounce
Petrolatum	1 pound

Melt the wax and petrolatum, and while cooling add the remaining ingredients, mixing well.

A good witch hazel salve may be produced by using the following formula:

Distilled Extract of Witch Hazel	12 fluidrams
Lanolin	6 drams
White Petrolatum	1 pound
Boric Acid	3 drams

Melt the petrolatum and lanolin together, and stir in the boric acid. Remove from the fire and stir until cold, adding the extract of witch hazel while cooling.

The following formula is claimed to produce a preparation very similar to one of the leading proprietary ointments:

Zinc Oxide	½ dram
Resorcin	20 grains
Subnitrate of Bismuth	½ dram
Oil of Cade	30 drops
White Petrolatum	6 drams

Melt the petrolatum and combine with it the other ingredients, rubbing to a smooth ointment.

White petrolatum, which is directed in the last two formulas, gives a more elegant preparation than do the darker shades of this material. Whether the improvement is great enough to offset the increased cost is a matter for the mixer to determine for himself.

A formula which I have found most excellent in practice is the following:

Carbolic Acid (crystal)	1 ounce
Menthol	168 grains
Resorcin	60 grains
Oil of Tar	2 ounces
Petrolatum	16 ounces

Melt the petrolatum on a water bath and add the carbolic acid, menthol and resorcin, stirring until dissolved. Remove from the fire and add the oil of tar, continuing the stirring until cold.

This ointment is adapted to all irritation of the skin, cuts, burns, etc., and has been found excellent in many cases of eczema. It is also useful in the treatment of piles or hemorrhoids, and is an all-round family ointment.

Some time ago I made an analysis of a salve which is quite popular in certain sections. It is more in the nature of a plaster than an ointment, but wonderful powers are ascribed to it in the way of healing cuts, sores, etc. The formula as shown by analysis is as follows:

Balsam of Fir	4 ounces
Burgundy Pitch	½ ounce
Resin	1 dram

Oil of Sassafras enough to scent slightly.

Melt the first three together and while cooling add the oil of sassafras. The exact quantity of this oil was not determined but from six to ten drops would serve to scent the above quantity of salve to practically the same degree as the sample.

In use this preparation is slightly warmed and spread on a piece of soft cloth large enough to cover the sore. It is then applied and left for several days. Should it be found necsesary to remove it at any time, it may be done by warming the part. Portions of the ointment which adhere to the skin may be removed with the aid of a little petrolatum.

The above seems to be a modified form of a salve which was formerly well known under the name of Green Mountain Salve.

This formula is found in many old recipe books being as follows:

Mutton Tallow	4 ounces
Burgundy Pitch	4 ounces

Beeswax	4 ounces
Resin	5 pounds
Oil of Wormwood	½ ounce
Venice Turpentine	½ ounce
Oil of Red Cedar	1 ounce
Oil of Organium	1 ounce
Oil of Hemlock	1 ounce
Balsam of Fir	1 ounce
Verdigris	1 ounce

The tallow, pitch, beeswax, resin and balsam of fir are melted together and the remainder of the ingredients added and mixed thoroughly with the mass while cooling.

Another preparation which is sometimes sold under the name of Green Mountain Salve is composed of resin, 3 pounds; mutton tallow, ¼ pound, and beeswax, ¼ pound. These are melted together, poured into cold water and then pulled out and worked to an even mixture. Form in sticks about three-fourths inch in diameter and four or five inches long. This is sometimes colored green by the addition of a small quantity of verdigris. By the way, it may be well to mention that verdigris is basic copper acetate.

The last salve is used the same as the two preceeding ones.

The following table of the absorbent values of different ointment bases as given by Practical Druggist will be found useful in devising special ointment formulas of your own. It shows the amount of water which the various bases will absorb and hold permanently.

Lard	100 parts	water,	15 parts
Benzoinated Lard	100 parts	water,	17 parts
Lard, with 5% glycerine	100 parts	water,	10 parts
Lard, with 2% resin	100 parts	water,	22 parts
Lard, with 10% vaseline	100 parts	water,	4 parts
Ointment	100 parts	water,	40 parts
Cerate	100 parts	water,	40 parts

Spermaceti Cerate.....	100 parts..	water,	30 parts
Cold Cream.....	100 parts..	water,	50 parts
Petrolatum	100 parts..	water,	10 parts
With 5% yellow wax..	100 parts..	water,	65 parts
Hydrous wool-fat lanolin.	100 parts..	water,	200 parts
Anhydrous wool-fat.....	100 parts..	water,	300 parts
Casein Ointment.....	100 parts..	water,	an indefinite amount

A very useful base for many forms of ointments is composed of paraffin wax and white paraffin oil in varying proportions. This gives a permanent, semi-transparent mixture which will keep indefinitely without turning rancid. The proportions may be varied to suit any particular purpose, the usual proportion being three parts of paraffin wax to seven parts of oil.

In devising special ointment formulas, it is only necessary to fix upon the therapeutic ingredients you desire to use, then select a suitable base and combine this base with the other ingredients in the proper proportions. There is no reason why any person with a fair knowledge of the therapeutic action of the various antiseptics, essential oils, etc., cannot produce an ointment which will compare favorably with any of these now before the public.

CORN REMEDIES.

In these days, the man or woman who is not blessed (?) with one or more corns is something of a curiosity and the prevalence of these "comfort destroyers" provides a wide field for the marketing of remedies designed to relieve or cure such troubles.

Corns are simply callouses caused by ill fitting shoes, either too tight or too loose. The hardened and thickened epithelium presses upon the delicate tissues beneath it and these tissues become exceedingly sensitive and painful. In some cases a bursa, i. e., a sort of sac filled with liquid,

forms beneath the corn and in such cases a radical cure is impossible until this sac as well as the callous which has been its exciting cause is removed. For this reason many corns seem to resist the action of so-called "corn cures" which, while they remove the epithelial growth do not penetrate deeply enough to destroy the bursa.

In corns of the type just described, the safest and most effective remedy is the chiropodist's knife. By the use of cocaine or some similar local anesthetic, the part is rendered insensible to pain and the corn with the underlying bursa is dissected out. By this means a radical cure is effected, but it should be remembered that the cause which induced the original corn will produce another in the same place unless it is removed. There is no such thing as getting rid of corns permanently unless perfect fitting shoes can be assured.

Some corn remedies of the caustic type will remove the corn entire but the use of these is not unattended with danger. They always cause a deep and slow healing sore, and while their effectiveness cannot be questioned, I should advise keeping entirely away from them, either for personal use or for sale. People are not partial to a corn cure which will render the use of crutches necessary to the user, regardless of how effective it may be.

A good corn remedy should cure all cases of recent corns and, by removing the source of irritation, afford great relief even where a cure is impossible without surgical aid, and should not cause inconvenience to the user. Such a remedy is found in salicylic acid, which possess the property of breaking down or dissolving the cutaneous tissues, acting slowly and without any painful effect. This chemical forms the active ingredient of practically every corn cure on the market and is beyond question the most effective and harmless remedy known for the purpose.

The ready solubility of salicylic acid and the ease with which it may be combined with various ointment bases gives

opportunities to the mixer to exhibit this remedy in a wide variety of forms. It makes little difference what vehicle is used in carrying the active ingredient so long as it brings it into direct contact with the corn and retains it there for a sufficient length of time to accomplish the desired purpose.

For the removal of soft corns, i. e., those which occur between the toes, a paste of soft soap and glycerin often suffices. Liquid remedies with a collodion base carrying salicylic acid as the active ingredient are also very effective for such corns.

In making a corn cure in salve form, the base should be of such consistence that it will remain where it is put instead of diffusing itself where it is not wanted. For this reason a base composed of resin, beeswax and tallow is preferable to petrolatum in such products. Lanolin forms an excellent base on account of its penetrating properties but is open to the same objection as petrolatum, i. e., its tendency to spread over the adjacent tissues when softened by the heat of the body.

In applying corn salves they should be spread on a bit of muslin or soft linen large enough to cover the corn and then held in place by a narrow bandage of soft cloth. Although there are several so-called "one night corn cures" on the market, it will generally be found necessary to keep the salve in contact with the corn for from three to six days in order to soften it sufficiently that it may be removed. Some manufacturers direct their remedy to be applied at night and removed in the morning, repeating this for three or four applications, but wherever possible it will be found better to continue the treatment day and night until the corn is removed. After using the remedy for three or four days the part should be soaked in water as hot as can be borne and in most cases the cuticle with the adhering corn may be easily removed with the fingers or a dull knife. In some cases

it may be found necessary to continue the treatment for a longer time

Occasionally where salicylic acid has been used as a corn cure, it is found that the corn will not readily come out on soaking the foot in hot water. In most cases of this kind if it is let alone for a day or two it will come away without any trouble.

Corn plasters are simply a kind of adhesive plaster on which a paste containing salicylic acid has been smeared. This paste is generally placed in the center of the plaster, leaving the adhesive portion around the edge to hold it in place. These plasters possess no advantages over salves except as regards convenience of using.

Corn pads are merely pieces of thick felt with a hole in the center and having one side covered with some adhesive substance to hold them in place. They are not curative in any sense but often relieve the pain of a corn by removing the pressure from the sensitive portion. A bit of absorbent cotton held in place by a narrow strip of adhesive plaster will accomplish about the same purpose.

The following formulas have been thoroughly tested and will be found as effective as anything which is safe to use:

LIQUID CORN REMEDY.

Salicylic Acid	11 parts
Extract Indian Hemp	2 parts
Alcohol	10 parts
Flexible Collodion to make	100 parts

Dissolve the Indian hemp extract in the alcohol, and the salicylic acid in about 50 parts of flexible collodion previously weighed a tared bottle. Then add the former solution to the latter and finally add enough flexible collodion to make the product weigh 100 parts.

This is the corn cure of the National Formulary and is typical of all this class of preparations.

In the above formula I have given the quantities of the ingredients in parts instead of in definite measure. This class of formuias has been a "thorn in the side" of many mixers for years, and these persons have tried to make themselves believe that formulas in parts are very difficult to understand. In fact, nothing could be simpler. It is only necessary to adopt some unit and adhere to it throughout. For example, in the above formula the first ingredient may be eleven drams, ounces, pounds or tons for that matter, according to the quantity in which the product is to be manufactured. If we use eleven drams of salicylic acid, we would use two, ten and one hundred drams of the other ingredients, respectively. If eleven ounces af salicylic acid is used, then the other materials would be taken in ounces also. The same holds true of pounds or whatever quantity may be taken as the unit.

In the above formula, should we wish to make exactly one pound or any other definite quantity of the product, it would only be necessary to find the total number of parts in the formula and use this as the denominator of a fraction of which the number of parts of each separate ingredient become the numerator and then take the fractional parts of the pound of each ingredient. To make the matter clearer, we will assume that we desire to produce one pound of the above corn remedy. Adding the number of parts we find the total to be 123 parts. Accordingly we take 11-123 of one pound of salicylic acid, 2-123 of one pound of extract Indian hemp and 10-123 and 100-123 of a pound of the other two ingredients respectively.

It will be noted that the quantities above are a trifle inconvenient to weigh and in most cases of this kind it will be sufficient to use the approximate instead of the exact weight of the different materials. For instance, 11-123 of

one pound (16 ounces) equals 1 53-123 ounces. 53-123 ounces approximates quite closely 3½ drams, which in a formula of this nature will be sufficiently accurate for all practical purposes. The same method of procedure may be followed throughout.

In the compounding of medicines for internal use such approximation of quantities might lead to serious results, especially where very potent ingredients are concerned, and should it become necessary to prepare such remedies from a formula where the quantities are expressed in parts, it is essential that the exact proportions be used. However, in ordinary commercial manufacturing the exact quantity produced is a matter of no great importance, it making little or no difference to the mixer whether he makes up a few ounces, more or less of a given product, as any remaining portion can be mixed with future lots. Therefore, it is only necessary to select the unit which will come nearest to giving the desired quantity and adhere to this throughout.

One more illustration, I trust, will make this matter perfectly plain. Suppose we desire to make up a gallon of a given product from a formula where parts are specified. On adding we find the total number of parts to be, say 125. We know that a gallon contains 128 fluid ounces, so by taking the ingredients in ounces according to the proportions specified we will have within three ounces of the desired quantity. This rule would apply, in its entirety, only to formulas where the ingredients are all expressed in the same kind of measure. Where part of them are given by weight and others by measure, it would be necessary to know the weight of the desired quantity of the finished product and of a definite quantity of each liquid ingredient. As such information would entail a large amount of detail work, it would hardly seem advisable to go to the trouble necessary to determine these points for the sake of getting exactly a specified quantity of finished product, where the

fact that we may have a few ounces more or less than this particular quantity is of no practical importance.

It doubtless will seem somewhat out of place to some of my readers, to put so lengthy a desertation on "parts by weight" at this particular point in this volume. It is a part of my purpose, however, to give information exactly where it is needed, and as this is the first instance where parts have occurred in a formula, it seems appropriate that the above explanations should appear in this place.

Returning to the subject of Liquid Corn Cures, it is somewhat interesting to note that Indian hemp appears in most formulas for such preparations, although just what definite purpose it accomplishes, aside from imparting a green color to the product, is not quite plain. It is true that this drug exerts a slight sedative action when applied externally, and this may account for its popularity. This may be omitted if it is deemed desirable to do so and any suitable coloring matter added in its place. For a green color, chlorophyll is entirely suitable. In a few instances this product has been colored red and marketed under the name of "Ruby Corn Cure."

The use of a small quantity of zinc chloride in the formula given above is sometimes recommended. This doubtless adds to its efficacy but should be used with caution as it is quite a powerful chemical and in excess would be likely to prove irritating.

It can easily be seen that, on account of the extreme volatility of ether, which forms a large part of the product we know as collodion, the bottles containing this preparation should be kept tightly corked to prevent evaporation.

Another liquid corn remedy is sometimes marketed under the name of "Corn Paint." This consists of a solution of resin in alcohol to which salicylic acid has been added in the desired proportion. It is used in the same manner as

the collodion preparations, i. e., by painting on the corn for three or four consecutive nights, then soaking the part in hot water and removing the corn with the fingers.

CORN SALVES.

I.

Beeswax	12	ounces
Venice Turpentine	1½	ounces
Resin	1	ounce
Balsam Peru	1	ounce
Salicylic Acid	1	ounce
Petrolatum	2	ounces

Melt the resin, beeswax, and Venice turpentine together, add the balsam Peru and mix well; add the petrolatum and when melted remove from the fire and stir in the salicylic acid while cooling.

Varying the quantity of resin will make the salve harder or softer as desired. This product is very adhesive and may be used in making corn plasters, simply cutting a piece of ordinary adhesive plaster of the proper size and shape and placing a small quantity of the salve in the center of the plaster. Cover the face of the plaster with oiled silk or gauze so they may be handled without sticking together. To use, remove the gauze and apply the plaster to the corn.

II.

Tallow	6	ounces
Resin	3	ounces
Salicylic Acid	1¼	ounces

Melt the tallow and resin together and incorporate the salicylic acid while cooling.

III.

Lanolin	1	pound
Salicylic Acid	1	ounce

Mix well.

White Petrolatum	1 pound
Salicylic Acid	2 ounces
Chloride of Zinc	2 drams
Carbolic Acid	1 dram
Oil of Bergamot	Enough to scent

Mix to a smooth salve.

CORN FILES.

These sell quite readily and also have been extensively used as an advertising novelty, the advertisement being printed on the wooden handle.

The base of the files is made of strips of pine or basswood, 4 inches long by one-half inch wide and 1-16 of an inch thick. The wood is stained dark brown with any ordinary wood stain. Then on each side of it for three inches of its length strips of paper prepared as follows are pasted, the blank inch at the end serving as a handle. Good stout dark paper is tacked by its corners to a flat board and then coated with ordinary glue. While this is still wet this mixture of powders is dusted over it taking care to deposit the powder in an even layer:

Powdered Glass	4 ounces
Powdered Boric Acid	1 ounce
Fine Powdered Emery	1 ounce

Mix the powders by sieving.

Before the glued and sprinkled paper is dry the surplus powder is shaken off to be used on the next sheet. Then when the sheets are quite dry they are cut into strips and glued on to the wooden handles.

Directions for use are: Soak the corn in warm water, dry well and then rub with the file until the hardened cuticle is removed.

CATARRH REMEDIES.

One of our American humorists has said there is no use

going away from home for a change of climate as six changes a day is about the average for most localities and the man who can't find something which will suit him among this variety is rather hard to satisfy. While this statement was intended purely as a joke, there is a germ of truth in it after all, and it is these frequent changes which are responsible for the prevalence of catarrhal trouble among the American populace.

Catarrh, like the poor, is "always with us" and while catarrh remedies are about as plentiful as flies in summer, there is always room for one more provided it is of the right quality. There is no question but that catarrh remedies are among the best sellers in the proprietary line, Peruna being an example of what may be done with a medicine recommended for this one trouble only. The manufacturers of this medicine state that it cures catarrh, and then proceed to prove to their own satisfaction that practically every disease is directly or indirectly due to catarrhal conditions of the system.

The term catarrh is used to cover a variety of pathologic conditions ranging from a slight cold to a general breakdown of the mucous membrane of the entire system. Specific names are assigned to catarrh of the various organs, as gastritis, which is applied to catarrh of the stomach; bronchitis to catarrh of the bronchial tubes, etc.

Being both a local and a constitutional disease, catarrh is best treated by a combination of medicines selected to act through the blood and directly upon the affected surface. Of course, where the disease affects organs which cannot be reached by direct treatment, medication must be accomplished through the blood, but even in these cases it is possible many times to make use of remedies which act directly upon the organs affected, in combination with those which exert a general alterative action. Such treatment, however, is a matter for the physician rather than for the the proprie-

tary manufacturer who should confine himself to remedies designed to relieve or cure nasal catarrh and its attendant evils.

Catarrh remedies are exhibited in various forms, those for local treatment being offered in liquid, tablet and powder form, while the internal remedies are generally liquids or tablets, although they sometimes consist of a powder put up in capsules.

The possibilities which the use of capsules afford the average manufacturer are often overlooked. The making of a tablet requires considerable skill supplemented by the use of more or less elaborate apparatus, but anyone can put up a powder in capsules and these form a good substitute for tablets in the case of many medicines. They cost but little and may be had in any required size and with a little experience in the work, the filling can be accomplished quite rapidly. I would, therefore, advise anyone taking up the manufacture of medicines on a small scale to investigate this subject and learn what can be done in the way of putting up various remedies in this form.

As a common cold is generally the beginning of catarrh, it would seem proper that we should consider first, remedies adapted to curing such a condition. The ingredients most often used for the purpose are quinine and acetanilid, which are generally combined with laxatives such as aloin, calomel, etc. One of the best combinations I have ever found is that contributed to the Bulletin of Pharmacy by a prominent druggist. This formula follows:

Quinine Sulphate	20 grams
Powdered Capsicum	20 grams
Powdered Acetanilid Comp.	40 grams
Aloin	6 grams

Mix thoroughly and fill into No. 2 capsules. Directions: One capsule every two hours until relief is obtained.

The acetanilid compound is composed of:

Acetanilid, powdered	60 grams
Sodium Bicarbonate	20 grams
Caffeine, citrated	20 grams

Mix thoroughly.

Although the quantities in these formulas are expressed in grams, drams or ounces may be used instead, provided the proportions are kept. A mixture of twenty drams of quinine sulphate, twenty drams of powdered capsicum, forty drams of powdered acetanilid compound and six drams of aloin would give the same proportion of ingredients as would the same number of grams of each ingredient. The same would hold true of ounces, pounds or any other unit, provided the same unit is adhered to throughout and it is self evident that if we divide the quantities by two or any other number we will still have the ingredients in the same proportion.

The following formulas from the same source will be found very effective:

COLD TABLET OR CAPSULE.

Quinine Hydrobromate	2 grains
Aloin	2 grains
Dover's Powder	½ grain
Powdered Capsicum	½ grain
Calomel	⅛ grain

The above quantity in each tablet or capsule. The dose for an adult is two tablets every three or four hours until the bowels act freely, then four times a day until a cure is effected. Children 12 to 15 years old take one tablet as above, smaller children one-half a tablet.

This formula could be improved by the substitution of resin of podophyllum for the calomel and replacing one-half of the Dover's powder with an equal quantity of the acetanilid compound made by the formula above. Quinine sul-

phate may replace the more expensive hydrobromate without impairing in any way the therapeutic effect of the remedy.

The so-called menthol inhalers afford great relief in cases of cold in the head and are also of value in chronic nasal catarrh on account of their antiseptic action. These consist of a glass tube open at either end and containing menthol, either alone or in connection with other ingredients of known value. The tubes cost about $1.00 per gross and the complete inhaler can be produced at a very low cost. They sell at ten to twenty-five cents each.

The following formula which is original with me, combines several of the best known remedies, and will be found highly satisfactory:

Menthol, crystals	2 drams
Thymol	5 grains
Eucalyptol	1 dram
Beechwood Creosote	15 drops
Alcohol	4 ounces

Mix well.

Use the inhaler tube mentioned above, having labels printed of proper size to fit inside the tube so that the directions, etc., may be read. Take either surgeon's bandage or thin cheesecloth cut in strips of the right width to nearly fill the tubes when rolled. Roll these rather loosely and saturate with the above liquid. Wrap the printed label around the cloth rolls and insert the whole in the tube. Close the large end of the tube with a well fitting cork and the inhaler is complete.

In using, the cork is removed from the tube, the smaller end inserted in the nostril and the air strongly drawn through the tube. The cork should be kept in place when the inhaler is not in use to prevent evaporation of the ingredients.

If white neutral paraffin oil is used instead of alcohol in making the solution, a better lasting inhaler will be produced. In this case it is well to have the labels paraffined after printing as the oil will saturate them and give them a greasy appearance. By putting the labels inside the tube instead of pasting them on the outside they will not become soiled by handling and the inhaler will present a much neater appearance.

Menthol dissolved in alcohol or paraffin oil makes a fairly good solution for saturating the rolls but it is not equal to the combination given above. Some very cheap forms of inhalers contain excelsior, dyed green and saturated with an alcoholic solution of menthol. These last but a short time before the strength is entirely gone and are suitable only for use where it is desired to produce the inhaler at the lowest possible cost.

A very popular type of catarrh remedy is in the form of a salve or jelly, as it is more often called. This is put up in tin boxes or collapsible tubes, the latter being preferable. These jellies consist of petrolatum combined with various antiseptics and are used by inserting a small portion of the preparation in the nostril and then inhaling deeply through the nose so as to diffuse the medicine over the affected membrane.

CATARRH JELLY.

I.

White Petrolatum	1 pound
Menthol	6 drams
Thymol	10 grains
Eucalyptol	2 drams

Melt the petrolatum on a water bath, and add the thymol and menthol, stirring until dissolved. When nearly cold, mix the eucalyptol thoroughly through the mass. This

makes a very strong medicine and the quantity of petrolatum may be increased if desired.

II.

Petrolatum	10 pounds
Oil of Wintergreen	1 ounce
Oil of Peppermint	4 ounces
Camphor	4 ounces
Iodoform	1 dram
Carbolic Acid	10 drops

Melt the petrolatum on a water bath, add the camphor and when dissolved remove from the fire. Incorporate the remaining ingredients when the mixture is nearly cold.

I have known one instance where this formula was sold for five hundred dollars and the purchaser considered that he obtained a great bargain, even at this price. The preparation was sold for years under the name of The Great South American Catarrh Cure and the manufacturer made a small fortune with it. Under the present laws regarding medicines, geographical names are barred unless the medicine or its principal ingredients are a product of the country indicated by the name, but there is no reason why the product, under some other title, should not prove a money maker for any enterprising mixer.

Catarrh snuffs are not as popular as they were before the knowledge that many of them contain a considerable proportion of cocaine, was so widely disseminated. However, it is possible to produce a first class remedy in this form without employing cocaine or any other harmful drug and if properly handled, there is no question but that a good trade might be built up on such a product. Some typical formulas follow:

CATARRH SNUFF.

I.

Cubebs in fine powder	1 dram

Powdered Sugar	2 drams
Powdered Menthol	12 grains
Powdered Boric Acid	½ dram
Oil Wintergreen	10 drops

Have all in the finest possible powder and mix thoroughly.

For the above formula I am indebted to Dr. E. B. Bush, of St. Louis, Mo., who has sold this preparation for several years with entire satisfaction to the purchasers. It is recommended for catarrh, cold in the head, headache, etc., the directions for using being to snuff a small quantity up the nostrils as far as possible, several times a day. It does not cause sneezing or any unpleasant sensation.

This preparation is sold in two dram bottles for twenty-five cents.

II.

Aluminium Acetate	1 dram
Menthol	1 dram
Acetanilid	1 dram
Bismuth Subnitrate	7½ ounces

Have all in the finest possible powder and mix intimately.

This formula is given on the authority of a prominent physician who claims that it will arrest a cold if taken in the early stages and stop a fully developed case of cold in the head in twelve hours.

III.

Boric Acid	2 drams
Aristol	2 drams
Bismuth Salicylate	2 drams
Common Salt	2½ ounces
Powdered Elm	12½ ounces

Powder as finely as possible, mix intimately and sift through bolting cloth.

IV.

Menthol	15 grains

Thymol	15 grains
Eucalyptol	15 grains
Orris Root	25 drams
Sodium Chloride (common salt	25 drams
Hydrastine Hydrochloride	15 grains
Powdered Elm	25 ounces

Mix as directed for No. 3.

PILE REMEDIES.

The disease known as piles or hemorrhoids is very prevalent and there are numerous remedies on the market designed to relieve or cure this trouble, most of which have proved profitable to their promoters. While there are many cases of this disease which will not yield to anything except surgical treatment, marked relief may be obtained from the use of a good salve or suppository and sufferers from this most annoying complaint are willing to pay a fair price for any remedy which will give temporary relief even though it does not bring about a permanent cure.

Up until a few years ago the surgical method adopted for the cure of hemorrhoids was a complete excision of the tumors, but at present many physicians and specialists use what is known as the "injection treatment" which consists in injecting the tumors with a strong solution of carbolic acid or some similar medicine which causes them to slough off. While this method of treatment has met with marked success, it is one which is adapted for use only by physicians so that no formulas for the solutions used or instructions for using same will be given.

Most of the pile remedies on the market contain astringents such as tannic acid, combined with opium and antiseptics and made up into a salve with petrolatum or other suitable ointment base. The suppositories contain about the same therapeutic agents as the salves but for the most part cocoa butter is used in making them up into a mass.

In the treatment of this disease, cleanliness is an absolute necessity. This is best accomplished by washing the parts thoroughly with warm water to which a little carbolic acid has been added, previous to applying the medicine. Care must also be taken to keep the bowels in good condition. For the prevention of constipation which is the usual accompaniment if not the actual cause of the disease, some mild cathartic like the compound licorice powder of the United States Pharmacopia should be taken often enough to produce a free movement of the bowels daily. Cathartics containing aloes, generally speaking, are objectionable in treating this disease on account of the irritating action of this drug on the lower bowel.

How often to apply the salve or other medicine, is largely a matter for the patient to decide for himself. In many cases, once a day will be often enough to use it, in which cases it should be applied at bedtime. Some advise using the medicine after each movement of the bowels, and also at bedtime. Particular stress should be laid upon the necessity for thoroughly cleansing the parts before applying the medicine and the keeping of the bowels open. No medicine, no matter how meritorious, will accomplish a cure unless these conditions are complied with.

The following formulas will produce ointments which have proved very satisfactory in the treatment of this disease and will, I trust, meet the requirements of anyone who wishes to market a pile remedy in salve form:

I.

Ichthyol	1 ounce
Phenol (Carbolic Acid)	½ ounce
Tannin	2 ounces
Extract Belladonna	½ ounce
Extract Stramonium	160 grains
Extract Witch Hazel	320 grains
Powdered Opium	1 ounce

Powdered Hydrastis	1 ounce
Powdered Hydrastis	1 ounce
Thymol	160 grains
Resorcin	160 grains
White Wax	4 drams
Petrolatum	18 ounces

Melt the white wax, add the petrolatum and when melted remove from the fire, add the resorcin and thymol, stirring until melted; add the remaining ingredients while cooling.

For the above formula I am indebted to the Bulletin of Pharmacy. It has proved of such value that I put it first among the formulas for this class of remedies and I believe that anyone who puts this on the market, using proper advertising for same, will find it not only a seller but a repeater.

This formula costs more to make up than most others but the remedy is of such merit that fifty cents may easily be obtained for a one ounce pot of the mixture. At this price the profits are all that could be desired.

II.

Tannic Acid	20 grains
Bismuth Subnitrate	1 dram
Powdered Opium	10 grains
Lanolin	3 drams
Petrolatum	5 drams

Mix to smooth ointment.

III.

Morphine Sulphate	1 dram
Tannic Acid	2 ounces
Tar	3 ounces
White Wax	3 ounces
Benzoinated Lard	2 pounds

Melt the wax with the benzoinated lard, and add the other ingredients while cooling, mixing well.

Powdered Opium	20 grains
Acetate of Lead	20 grains
Tannic Acid	20 grains
Petrolatum	2 ounces

Have the ingredients in the finest possible powder, and mix intimately. Then mix with the petrolatum, rubbing to a smooth ointment.

The following combination remedy for the treatment of hemorrhoids is highly recommended:

External Lotion.

Castor Oil	2 ounces
Oil Organium	1 ounce
Camphor	1 ounce

Dissolve the camphor in the oils, heating gently if found necessary. Shake well before using.

This should be applied at bedtime.

Internal Remedy.

Tincture Erigeron	1 dram
Fluid Extract Hydrastis	1 ounce
Fluid Extract Butternut	2 ounces
Fluid Extract White Poplar	1 ounce

Mix. Take a teaspoonful after meals in half a glassful of water.

Laxative Remedy.

Confection Senna	3 ounces
Sulphur	1½ ounces
Cream of Tartar	1½ ounces
Syrup of Ginger	Enough

Mix the sulphur and cream of tartar intimately, then add the confection of senna and enough syrup of ginger to make a mass like dough. Form into tablets or pieces about as large as an ordinary candy lozenge. One of these lozenges is to be taken three times a day, or often enough to keep the bowels in good condition.

Suppositories are a popular form of exhibiting remedies for the treatment of hemorrhoids. The manufacture of these calls for considerably more skill than is required in making salves or ointments. While the process is not beyond the abilities of the average mixer, there are certain details which must not be overlooked if a first class product is expected. Among the vast fund of literature on this subject, the most helpful article I have found is one which appeared in The Pharmaceutical Era several years ago and with the kind permission of the editor of this journal, the article is herewith re-printed.

This form of medication may be intended for general or local diseases. Medicines introduced into the rectum in the proper condition will produce the same action upon the system as when swallowed, the action being, however, slower. They are generally used in local treatment as in hemorrhoids. The essential features of a suppository are firmness, non-irritating properties, and freedom from rancidity. They should melt at the temperature of the body.

The use to which it is intended governs its shape and size, those intended for the rectum being cone-shaped, those for the vagina being twice as long as the rectal, or they may be made in slender rolls three-fourths inch to one and one-half inches long, and pointed at one end if designed for the nasal or urethral passages, or cartridge shaped if intended for the ear. Suppositories of ignatia, nux vomica or strychnine act very quickly when administered through the rectum, and small doses are preferable.

Packing.

Suppositories should be sent out only in tight boxes lined with wax paper and should never be packed in bulk.

Coating.

When glycerin or volatile substances are used, suppositories are often coated with some protective agent as wax,

paraffin, or flexible collodion. But these films must be removed before the patient uses them, otherwise the ingredients do not melt or become absorbed. The advantage in the use of suppositories over other external or semi-external medication is that the drug acts by a slow general absorption, producing its effect more slowly.

Two Pile Suppository Formulas.

I.

Iodoform	30 grains
Extract of Belladonna	3 grains
Morphine Sulphate	1½ grains
Cacao Butter	180 grains

Mix and make 12 suppositories.

II.

Extract of Witch Hazel	60 grains
Tannin	12 grains
Powdered Opium	4 grains
Cacao Butter	180 grains

Mix and make 12 suppositories.

Bases.

Cacao butter is an excellent base and is more commonly used. It melts at 86 F, is free from rancidity and can be incorporated with oils. When mixed with volative oils, creosote, or chloral, its melting point is lowered and it becomes necessary to use some hardening material, such as spermaceti or paraffin. In order to bring the melting point of the suppository as near to the temperature of the body as possible, use five parts cacao butter to one part of spermaceti. In suppositories for hemorrhoids where slow absorption is desired, spermaceti is preferable. Wax or paraffin raises the melting point higher.

Lard should never be used as it becomes rancid. Lanoline is more readily absorbed than cacao butter, has the same

melting point, and is best used in suppositories containing much extract.

Soap.

Soap is used as a base when a laxative action is desired, and is a good medium for working fluids with cacao butter, but it is incompatible with metallic salts, forming an insoluble metallic soap.

Glycerin Gelatin Suppositories.

Glycerin gelatin is not a good general base, as many bodies decompose or liquefy it. If oils or other liquid medicaments are to be used, hard glycerin gelatin should be used. This is prepared as follows: Add 70 c c water to 25 grains gelatin. Allow to stand until soft and add 50 grams glycerin and heat until the whole is reduced to 100 grams. Tannin, preparations of tannin, metallic salts and pepsin are incompatible with gelatin.

Gelatin suppositories are not as quickly absorbed and have a rubber like feeling and cling to the surface of the rectum if not wet before insertion. They must be kept dry and cool for they are hygroscopic and will melt if moistened. Equal parts of oleic and stearic acids are used as excellent solvents for alkaloids, and are a good substitute for cacao butter.

Moulds.

Moulds are made of brass, nickel, or white metal, and should separate longitudinally, rendering the ejection of the suppositories much easier. All moulds should be standardized to volume capacity. Suppositories can be made in three ways, namely: Hot process, cold process, and by machines or pressure.

Hot Process.

Melt two-thirds of the cacao butter intended for use over a water bath and allow to cool to 94 degrees F. To

the remaining one-third add the medicating ingredients. Powders and salts should be rubbed to an impalpable powder with the butter. Extracts should be softened, diluted with a little water or alcohol and then incorporated with the reserve butter. Add the medicated one-third portion to the first two-thirds portion, and pour into the moulds chilled on ice or freezing mixture.

The Critical Point.

The critical point is the temperature at which the mixture is poured into the moulds. If too hot insoluble salts will settle at the apex of the suppository before the mass sufficiently stiffens to hold them in suspension. Extracts of belladonna, stramonium, and hyoscyamus are precipitated in granular condition by an excess of heat and cannot be reincorporated. Volatile bodies, as extract of conium and alkaloids, are decomposed. The mass should just begin to thicken before pouring, for then the suppositories are more easily removed from the moulds and less liable to bend. Alboline oil or lycopodium prevent sticking of the mass to the mould.

Cold Process.

The cacao butter or other base is medicated with the ingredients and 5 per cent. glycerin or oil of sweet almond is added, the whole being mixed in a cylinder and forced into the moulds by means of machine pressure.

Some additional formulas for pile remedies in suppository form follow:

I.

Wheat Flour	1½ ounces
Fluid Extract Hamamelis	1 ounce
Cocoa Butter	1 pound

Mix the flour with the fluid extract of hamamelis, and as soon as they are well combined pour in a little of the cocoa butter which has been previously melted and mix well;

then add the remainder of the cocoa butter and mix to an even paste. Mould into cones of 20 grains each.

Directions for use: For mild cases, insert one of the cones into the rectum at bedtime; in severe cases, use one after each movement of the bowels and also on retiring.

II.

Salol	20 drams
Acetanilid	20 drams
Extract Belladonna	1 dram
Petrolatum	150 drams

Beeswax, enough to make a mass stiff enough to be moulded into suppositories. These should weigh 20 grains each.

Directions for use: Insert one of the suppositories into the rectum three times daily.

III.

Powdered Opium	1½ drams
Tannic Acid	80 grains
Extract of Hamamelis	1 dram
Cocoa Butter	150 drams

Mix thoroughly into suppositories of 20 grains each.

Directions for use: Insert one of the cones into the rectum at bedtime.

RHEUMATIC REMEDIES.

These may be divided into two classes, i. e., internal and external. The internal remedies are most often put up in tablet form, although several firms are marketing a liquid medicine for this disease. Most of these preparations depend largely upon the salicylates for their effect, these being supposed to possess the power of neutralizing, in a measure, the uric acid in the blood, to which most physicians ascribe this disease.

There are several varieties of the disease, each of which is characterized by a particular train of symptoms. That

any medicine would prove successful in curing all cases, is too much to be expected, but the fact that so many concerns are engaged in the sale of medicines designed to cure this disease, is evidence that there is a large demand for such remedies, and the further fact that quite a number of these same firms have been in business for a number of years would seem to indicate that their medicines possess a certain degree of efficacy.

In the way of external remedies, the formulas given under the head of Liniments will meet every requirement, therefore, I shall confine myself principally at this point, to the discussion of internal remedies adapted to alleviating or curing rheumatism.

The following formula makes a remedy very similar to that now being used by quite a number of advertising physicians and "Institutes" making a specialty of treating this disease. They may be had from any reliable firm of manufacturing chemists in lots of 1000 and upward at a very reasonable price:

Salicylic Acid	2 grains
Bicarbonate of Soda	2 grains
Capsicum	½ grain
Wine of Colchicum	1 minim

The above quantity in each tablet.

The directions should advise taking three tablets daily, the last dose being at bedtime.

These tablets may be put up either in glass bottles or wooden boxes. Paper boxes are hardly suitable for mailing purposes, owing to the ease with which they are crushed. There is on the market what is known as wooden bottles or vials, which may be had from any firm making a specialty of turned wood boxes. These make excellent containers for any remedy in tablet form and their cheapness and light weight recommend them for use with any tablet remedy to be sold by mail.

A prominent physician who has met with marked success in the treatment of rheumatism uses the following formulas:

I.

Tincture Aconite	1 dram
Ammonium Chloride	½ ounce
Potassium Nitrate	3 drams
Fluid Extract Cimicfuga	2 drams
Syrup enough to make	4 ounces

Mix.

The dose is a teaspoonful every two hours during the first week of an attack of acute rheumatism. Some good liniment should be used over the painful parts, using plenty of heat and friction in applying and in case the pain is intense, covering the part, after applying the liniment, with warm flannel.

Where the disease has run a week or more, he recommends the following treatment:

Tincture Colchicum Seed	3 drams
Pulverized Guiac Resin	1 dram
Potassium Iodide	1 dram
Cinnamon Water and Syrup, equal parts, enough to make	4 ounces

Mix, and take a teaspoonful every two hours.

The following tablet is sometimes found useful in controlling the severe pains of this form of the disease, but its use would be contra-indicated where there is any serious derangement of the heart, on account of the depressing action of the acetanilid:

Dover's Powder	1 dram
Quinine Sulphate	1 dram
Acetanilid	½ dram
Bicarbonate of Soda	1 dram

Make into 24 tablets of equal size.

The dose is one tablet every two hours until the pains are relieved.

Still another formula which has proven effective in the treatment of chronic rheumatism, is the following:

Salicylate of Soda	5 grains
Extract Colchicum Root	½ grain
Extract Phytolacca	½ grain
Potassium Iodide	1 grain

Put up the above quantities in a capsule, one capsule being a dose.

It is generally necessary to continue this remedy for a considerable time in order to obtain permanent results.

While the above formulas are more along the line of those used by physicians, than of the kind generally sold by advertising specialists, they will prove of interest as showing the principal remedies depended upon for the treatment of this disease.

Oil of wintergreen (methyl salicylate) is another drug which is of particular value as an internal remedy in this disease. It is generally used in connection with other medicines such as guiac resin, etc. This drug will also be found of special value as an ingredient in liniments designed to relieve rheumatic pains.

A somewhat unusual form of remedy for rheumatism, which has proved effective in many cases, is an ointment containing ichthyol and salicylic acid combined with lanolin. This is applied locally over the painful parts, and is claimed to be especially valuable for the treatment of painful joints.

Several of the large firms of pharmaceutical manufacturers carry a stock tablet for the treatment of rheumatism, some of which might be found suitable for a mail order specialty. The following formulas show the composition of some of these:

I

Extract Colocynth Compound	1½ grains

Extract Colchicum Root	1 grain
Extract Hyoscamus	⅓ grain
Calomel	⅓ grain

The above quantities in each tablet.

II.

Quinine Sulphate	1 grain
Extract Colchicum Root	1 grain
Extract Colocynth Compound	½ grain
Extract Hyoscyamus	¼ grain
Powdered Opium	¼ grain
Mass of Mercury	1 grain

The above quantities in each tablet.

The dose of this tablet is one, three or four times daily until a laxative action is obtained.

The following formula was obtained from a prominent western physician, who claims that it is the most effective remedy he has ever found in the treatment of this disease:

Sodium Salicylate	2½ grains
Powdered Capsicum	1⅛ grains
Wine of Colchicum	1 minim
Sodium Bicarbonate	2½ grains
Guiac Resin	1 grain
Excipient	q. s.

The above quantities in each tablet.

Directions: One tablet three times a day, taken between meals with a large glass of water. This physician claims that it is very important that large amounts of water be taken, as this assists the kidneys in the work of eliminating the uric acid from the blood.

The following external application will be found useful in connection with the above tablets:

Salicylic Acid	2 drams
Oil of Wintergreen	1 dram
Distilled Witch Hazel	1 ounce

Oil of Mustard (true)	5 minims
Alcohol	4 ounces

Mix.

Apply night and morning to the painful parts.

This makes a very elegant form of liniment, being water white, and will not stain the skin or clothing.

The following formula is given on the authority of a physician in charge of one of the principal sanitariums in the southern states:

Sodium Salicylate	½ dram
Fluid Extract Eupatorium	2 drams
Fluid Extract Jaborandi	1 dram
Wine of Colchicum	1 dram
Syrup of Orange	1 ounce
Peppermint Water sufficient to make	8 ounces

Mix.

Directions: Take a teaspoonful three times a day, after meals.

This is claimed to be particularly effective in curing chronic rheumatism.

The following is an exact copy of a prescription written by a prominent physician, being the treatment used by him in practically all the cases of rheumatism met with in his practice:

Salicylate of Soda	2 drams
Elixir of Calisaya, Iron and Strychnine	3 ounces

Mix.

Dose: A teaspoonful, three or four times daily.

The following formula is also a copy of a prescription which has proved very effective:

Salicylate of Soda	1½ drams
Iodide of Potash	95 grains

Wine of Colchicum	7 drams
Elixir Lactopeptine, enough to make	4 ounces

Mix.

Dose: A teaspoonful after each meal.

The last formula under this head is the private formula of a druggist who has met with considerable success in the sale of the medicine made thereby.

Sodium Salicylate	6 ounces
Fluid Ext. Colchicum Seed	1 ounce
Fluid Extract Black Cohosh	8 ounces
Potassium Acetate	4 ounces
Simple Syrup	8 ounces
Water	40 ounces

Mix, agitating until a complete solution is effected.

Dose: A teaspoonful three or four times a day.

I have given the above subject very thorough treatment and believe that I may safely say that a more valuable collection of formulas for the treatment of a single complaint have never been presented. They represent not guess work nor mere theory, but instead, information gleaned from strictly reliable sources and formulas which have proven entirely satisfactory in practice. The larger part of these formulas have never before been made public and I trust they will prove a valuable addition to the sum of general knowledge on this subject.

PAIN REMEDIES.

Under such names as Pain Ease, Pain Killer, etc., this class of remedies has been popular for more years than most of us can remember. One of the oldest as well as one of the best preparations of this nature is the old tincture of Myrrh and Capsicum, made from the following formula:

Capsicum	½ ounce
Myrrh	1 ounce

Alcohol	1 pint

Mix, macerate in a warm place for ten days, then filter.

This is generally given in doses of five to thirty drops in a little sweetened water. It is the old familiar "Hot Drops" of our grandparents and is as good to-day as ever. Another name by which this is familiarly known to druggists is Number Six.

Sometimes additions are made to this formula, sulphuric ether, chloroform, and oil of sassafras being the ones most often used. While the addition of a small quantity of oil of sassafras, say 3 drams to the above quantity, might be considered of value, there seems to be little or no reason for using such ingredients as ether or chloroform in such a mixture.

II.

Alcohol	2 pints
Guiac Resin	1 ounce
Tincture Myrrh	½ ounce
Spirit of Camphor	½ ounce
Tincture of Capsicum	½ ounce
Tincture of Opium	½ ounce

Mix.

This makes a good all 'round liniment and is used internally in doses of 30 to 60 drops, taken in sweetened water, either hot or cold.

This formula has been sold by several parties under the name of The $1000 Pain Cure, it being claimed that the originator of the formula received this amount for same.

III.

Tincture Lobelia	2 drams
Tincture Capsicum	2 drams
Tincture Prickly Ash Bark	4 drams
Tincture Cinnamon	4 drams
Tincture Camphor	6 drams
Menthol	1 dram

Alcohol (95%) enough to make	6 ounces

Mix, shaking until dissolved.

Directions: Internally, for colic, diarrhoea, etc., take 10 to 30 drops in a little water. For children the dose is reduced according to age, 2 or 3 drops being the proper dose for a child of six years. The dose may be repeated, if necessary, in about two hours.

Externally, it is used the same as any liniment, applying freely and rubbing in well. In cases of acute pain, a warm flannel cloth saturated with the liquid may be applied to the affected part. Care should be used in applying in this way, or a blister may be produced.

This is also claimed to be particularly effective in colic of horses, the veterinary dose being one to two tablespoonsful in a pint of warm water, repeating in two hours if necessary.

This can hardly be termed a cheap remedy, but is of sufficient merit to justify paying a fair price for it.

IV.

Alcohol	1 pint
Menthol	½ ounce
Tincture Myrrh	½ ounce

Mix.

Directions: Same as for No. 2.

Several parties have made considerable money from a preparation put up in dry form, designed to be mixed with alcohol, etc., to make a pain cure. The following formula is typical of this class of preparations:

Dried Mint Leaves (Peppermint	1 ounce
Aqua Ammonia	½ ounce
Tincture Capsicum	½ ounce
Oil Peppermint	1 dram

Mix the liquids with the powdered mint leaves to form a sort of paste, and put up in packages of three-fourths

ounce each, wrapping in tinfoil, over which is placed a printed label.

Directions: Mix the contents of the package with four ounces of grain alcohol, let stand for a day in a moderately warm place, then add water enough to make two pints. After standing for a day or two, with frequent shaking, filter.

For external use this is applied as any liniment; internally, the dose is 15 drops in half a glass of water.

HEADACHE REMEDIES.

Practically all of these depend upon acetanilid for their effect. This is generally combined with caffeine and monobromated comphor, one of the best combinations being the well known Migraine tablets sold by every druggists. These tablets, put up in packages of suitable size, make as good a headache remedy as can be had. They may be had from any pharmaceutical manufacturer at a low price, either with or without coating. The formula is as follows:

I.

Acetanilid	2 grains
Citrated Caffeine	½ grain
Camphor, Monobromated	½ grain

This is known as Migraine No. 1, and may be had in a plain compressed tablet or with chocolate coating.

II.

The Migraine No. 2 is the same as No. 1, except that the quantities of the ingredients are increased, 3 grains of acetanilid, 1 grain of citrated caffeine, and 2 grains of camphor, monobromated being used instead of the quantities specified in No. 1.

III.

Acetanilid	2½ grains
Sodium Salicylate	1 grain
Extract Hyoscyamus	⅛ grain
Tincture Gelsemium	2 minims

Camphor, Monobromated	½ grain

This formula is known as Migraine Improved.

If a head ache powder is wanted, the quantities of the different ingredients specified may be mixed together and dispensed either in capsules or wrapped in papers as ordinary powders.

The dose of all the above is one to two tablets or powders, repeated in two hours if necessary. It should be remembered that acetanilid exerts a depressive action on the heart and has been known to produce serious results where this organ was especially weak.

COUGH REMEDIES.

The name of the cough remedies on the market is legion. Almost every druggist has his "own make" of cough medicine to say nothing of the numerous proprietary preparations offered to the public.

There is a good demand for remedies of this kind during the winter months, and despite the large number of these now on the market, there is an opportunity to build up a good trade with a meritorious preparation of this kind.

Most of the published formulas call for the use of a small quantity of opium or some one of its derivatives, the effect of many of these being due to the sedative action of this drug.

One of the best known remedies is often sold under the name of White Pine Expectorant or White Pine Syrup. This is made as follows:

Morphine Sulphate	8 grains
Fluid Extract of Ipecac	½ ounce
Chloroform	1 dram
Tincture of White Pine	2 ounces
Sugar (white)	14 ounces
Water	8 ounces
Magnesium Carbonate	½ ounce

Rub the tincture of white pine with the magnesium carbonate, in a mortar, until well mixed. Add the water, stirring well and filter. Now add the fluid extract of ipecac, mix well and filter again. Mix the chloroform with the sugar, in a wide mouth bottle, add the morphine and the filtered liquid, agitating until the sugar is dissolved.

The tincture of white pine is made by dissolving two ounces of white pine turpentine (gum thus) in 14 ounces of alcohol. The gum should be divided into small pieces to hasten the solution and after adding to the alcohol, stand the mixture in a warm place, with occasional shaking until the gum is dissolved.

Of the cough remedies made without morphine or opium, the so-called Balsam of Linseed and Aniseseed is one of the best. The formula follows:

Cheap Black Molasses (not N. O. Molasses)	2 pounds
Oil of Anise	½ ounce
Camphor	½ ounce
Linseed Oil (raw)	2 ounces
Benzoic Acid	½ ounce
Alcohol	1 pint
Water	4 gallons

Melt the molasses with the water, mix the remaining ingredients with the alcohol and when dissolved add to the water and molasses mixture. Agitate until well mixed. If desired the color may be made darker by the addition of caramel coloring.

The dose is one to two tablespoonfuls four or five times a day.

The above formula is given as it appears in the original from the collection of Dr. R. P. Brook. Personally, I should advise reducing the water one-half and the dose of the medicine accordingly as two tablespoonfuls is rather too large a

dose to be prescribed unless we sell the medicine in gallon jugs.

BABY COUGH SYRUP.

Ammonium Chloride	1 dram
Fluid Extract of Licorice	½ dram
Oil of Anise	5 drops
Chloroform	½ dram
Simple Syrup	4 ounces

Mix the ammonium chloride with the fluid extract of licorice; mix the oil of anise with the chloroform, add this to the fluid extract, etc., and then add the syrup, shaking well until mixed.

Give one-fourth to one-half teaspoonful, repeating in 30 minutes if necessary.

This mixture is especially adapted to children on account of no opium entering into its composition, hence the name.

The following Herbal Cough Remedy has been found thoroughly reliable and the fact that it contains neither alcohol nor opium ought to prove a strong selling feature:

Horehound Herb	1 ounce
Mullein Leaves	1 ounce
Sanguinaria Root	1½ drams
Water	2 pints
Syrup of Tar	2 ounces
Honey	4 ounces
Sugar	1½ pounds
Syrup enough to make	½ gallon

Infuse the horehound and mullein with the water, cool and strain; dissolve the sugar in this liquid by agitation, add the remaining ingredients, mixing well.

The dose of this is a teaspoonful or less, once in two hours, or as needed.

For the above formula I am indebted to The Druggist's Circular.

A point well worth knowing, in connection with the administration of any cough medicine, is that in cases of cough caused by bronchial irritation, or as it is commonly called "tickling in the throat," small doses (three to ten drops) often repeated, are more effective than the full dose taken at longer intervals.

COUGH DROPS.

These are lozenges designed to be used by allowing them to slowly dissolve in the mouth. They are quite popular and pay a fair margin of profit. Unless you are experienced in such work, it is well to turn your formula over to some manufacturing confectioner and have him make up the cough drops for you in quantities, simply doing the packing, labeling and selling yourself.

The following is a typical formula:

White Sugar	1 pound
Glucose	2 ounces
Water	4 ounces
Fluid Extract of Licorice	1 ounce
Oil of Anise	80 minims
Oil of Sassafras	320 minims
Powdered Charcoal	320 grains

Mix, the sugar, glucose and water and boil together until it will harden when dropped into cold water, so that a piece pressed between the fingers will crack. Remove from the fire, add the remaining ingredients and pour out into moulds, or into shallow trays to cool. If trays are used it will be necessary to score the mixture while cooling so that it can be broken up into small squares.

The charcoal is for color only and may be added at any time during the mixing process. The quantities of the oils may be varied to give any desired strength.

THROAT REMEDIES.

These differ from cough remedies in being intended to

specifically apply to soreness of the throat, hoarseness, etc. While any of the cough remedies given, taken in small, oft' repeated doses, will often prove very effective in relieving such conditions, the following will be found of special value in the treatment of throat affections arising from irritation of the vocal cords, whether the result of a cold or too much exercise of these organs:

Tincture Ferric Chloride	2 drams
Glycerin	2 ounces
Water enough to make	4 ounces

Mix.

Dose, half a teaspoonful three times daily. It will also be found useful to take a few drops occasionally, allowing the medicine to remain in contact with the affected parts as long as possible.

In taking any medicine containing iron, care should be exercised to prevent its coming in contact with the teeth on account of the tendency of this substance to discolor them.

Many of the so-called "throat tablets" now on the market are simply chlorate of potash made up in tablets of about five grains. These may be had from any druggist. They are sometimes put up in small screw top flasks holding about fifty tablets, and retailed at ten cents.

An improvement over this tablet is the following, which is carried in stock by most of the pharmaceutical manufacturing houses:

Potassium Chlorate	1 grain
Boric Acid	½ grain
Sodium Benzoate	½ grain
Oil of Wintergreen	½ grain

Sugar sufficient to make a five grain tablet.

Directions for use: Dissolve one tablet on the tongue every hour.

These tablets cost about eighty-five cents per thousand and may be had even cheaper in large quantities.

The formula given below differs greatly from most of those in this volume, in that it has never been used commercially, but is an old-time family remedy. It is of such merit in cases of sore throat, canker, etc., that I believe it will form a valuable addition to the sum of knowledge on this subject.

Sage	1 ounce
Wood Lettuce	1 ounce
Gold Thread	1 ounce
Powdered Alum	1½ drams
Powdered Borax	1½ drams
Molasses	1 pint
Water	2 quarts

Put all the ingredients except the molasses in a porcelain or enamelled kettle and boil until the strength is extracted from the herbs. Strain through muslin and again return to the fire, adding the molasses and cooking until the mixture is of the consistence of very thick cream.

It is used by applying the syrup to the affected parts, so far as they can be reached, by means of a small swab. It may be swallowed in small quantities without any danger, but it is the local action that is desired.

This formula has been in use for many years and has many cures to its credit. The party from whom it was obtained states that it is effective even in such diseases as diphtheria, but it is always safest to trust these dangerous ailments to a physician instead of attempting to cure them by means of simple remedies.

BURNS, REMEDIES FOR

One of the most effective remedies for the treatment of burns is what is commonly known as Carron Oil, consisting of equal parts of raw linseed oil and lime water, mixed and shaken to form an emulsion. This is applied to the burned surface, and covered with lint or a soft cloth.

A modified form of this remedy makes use of thymol in connection with the ingredients mentioned above, in the proportion of one-third grain of thymol to each ounce of the mixture. This may be dissolved in the oil by aid of gentle heat before adding the lime water. This gives the mixture a slight antiseptic action and will be found a valuable addition.

Another excellent remedy consists of distilled witch hazel, with two or three grains of menthol to each ounce of the liquid. This gives a remarkable cooling effect and will tend to prevent the part from being infected. It is generally applied on a gauze bandage, which is kept saturated with the mixture.

Where the burn covers only a small surface, it is often found useful to pencil the part with a solution of nitrate of silver, made on the basis of twenty grains of the salt to an ounce of pure water. Apply by means of a camel's hair brush.

A few years ago, a prominent French physician, Dr. Thierry, advocated the use of a solution of picric acid in the treatment of burns. This makes a very effective remedy, but I should hesitate to apply it where a large surface had been denuded of the cuticle, for fear of poisoning resulting from absorption of the acid. Used in the proportion of half a dram of the acid to a pint of water, it will be found to act very quickly in relieving the pain of the burn, and by its antiseptic action will promote rapid healing. It possesses the objection of leaving a persistent yellow stain, even when used in dilute solutions.

COURT PLASTER.

Generally speaking, it will be found more satisfactory to purchase this, as well as all other kinds of plasters, from firm having facilities for making them upon a large scale. The theory of making plasters is simple enough but it is

impossible to produce as good an article by hand as can be made by the improved machinery now in use.

The ordinary, waterproof court plaster, is simply a piece of silk or mercerized cotton coated on the face with several applications of isinglass dissolved in water, and on the back with some substance impervious to water, as tincture of benzoin. In making on a small scale the cloth may be stretched on a wooden frame, and the solution, made by dissolving one-half ounce of French or Russian isinglass in four ounces of water, painted over it with a flat soft brush. Allow to dry and apply another coat, repeating this process until the desired adhesiveness is obtained. When again dry, coat the other side with one or two applications of tincture of benzoin made by dissolving gum benzoin in alcohol to the point of saturation.

What is known as liquid court plaster has been quite extensively sold and there is still a fairly brisk demand for a preparation which will take the place of the ordinary court plaster and be free from its objectionable features, such as sticking together when carried in the pocket, curling up and coming loose from the part to which it is applied, etc.

A common formula for this product is:

Collodion, flexible	10 ounces
Canada Balsam	20 grains
Castor Oil	10 drops

Mix well, by shaking.

The fact that the collodion causes smarting when applied to places where the skin is broken, has led to a considerable search for something which would replace it but be free from this objection. The result has been that a large number of substitutes for this ingredient have been offered which are more or less satisfactory. In order to give as complete information as possible on the subject, I reprint, by permission, the following from The American Druggist. This is the most complete list of formulas for this product I have ever

found and there is no doubt but that among them will be found those which will meet every requirement for a preparation of this kind.

UNNA'S MEDICATED SKIN VARNISHES.

"Skin varnish" is the term applied by Unna to preparations used in dermatological practice for forming a thin covering on the skin. The principal bases for these preparations are the following:

Bassorin Varnish.—The pure bassorin basis is obtained, according to Elliot, by filtering tragacanth mucilage (15 : 100) in a filter heated by steam, evaporating and mixing with glycerin. A similar basis may be prepared by stirring 5 parts powdered salep with 95 parts cold water until a smooth mucilage is obtained, then heating for a half hour on the steam bath. The salep basis contains less bassorin but more starch.

Casein Varnish.—The casein, obtained by coagulating skim milk with rennet at a temperature of 35° to 40° is washed and dried until it forms a yellowish-white, sandy powder soluble in alkaline solutions. In preparing the casein varnish, this casein is dissolved by means of borax. For 20 parts casein, 2.5 parts of borax and 77.5 parts of water furnish a rapidly drying uniform covering material. The alkaline characters of the borax are marked by the casein. Admixtures of heavy pulverulent substances readily settle out of this basis, and it is requisite to distribute them by shaking. A varnish of casein and glycerin is prepared by dissolving the casein in 3 or 3.5 parts of ammonia, adding a quantity of glycerin equal in weight to the casein, and heating to drive off the ammonia. The resulting mass mixed with twice its weight of boiling water gives an excellent permanent emulsion.

Amber Varnish is made by dissolving a mixture of amber and turpentine in alcohol. It must not be used as a vehicle for the application of zinc oxide.

Castcr Oil and Shellac Varnish.—With 1 part shellac, ⅕ part castor oil and 3 parts alcohol a varnish is obtained which forms a good flexible covering easily removed by alcohol.

Canada Balsam and Collodion Varnish.—Sixteen parts collodion with 1 part Canada balsam gives a material suitable for the application of pyrogallol, and it can easily be removed by alcohol.

Castor Oil and Collodion Varnish.—Eight parts collodion and 1 part castor oil.

Lead Ricinoleate Varnish.—One part lead oxide heated with 1.5 part castor oil to saponification and mixed with 2 parts absolute alcohol gives a good skin varnish.

Chrysarobin Amber Varnish.—One part chrysarobin and 20 parts of amber dissolved in turpentine.

Pyrogallol Shellac Varnish.—One part pryogallol, 1 part castor oil, 5 parts shellac and 15 parts absolute alcohol.

Salicylic Acid, Canada Balsam and Collodion Varnish.—One part Canada balsam, 10 parts collodion and 3 parts salicylic acid.

Zinc Oxide, Castor Oil and Collodion Varnish.—Two parts zinc oxide, 2 parts castor oil and 16 parts collodion.

Zinc and Lead Ricinoleate Varnish.—Five parts lead ricinoleate, 8 parts zinc oxide, 8 parts absolute alcohol and, lastly, 1 part each of collodion and ether.

Ichthyol Borax Casein Varnish.—Five parts sodium ichthyolate and 15 parts borax casein varnish.

Sulphur Glycerin Casein Varnish.—Five parts sulphur and 15 parts glycerin and casein varnish.

Zinc Oxide Salep-Bassorin Varnish.—Two parts zinc oxide and 18 parts salep-bassorin varnish.

Zinc Ichthyol Tragacanth-Bassorin Varnish.—One part sodium ichthyolate, 2 parts zinc oxide, and 17 parts tragacanth-bassorin varnish.

OBESITY REMEDIES.

I feel that I am treading upon somewhat dangerous ground when I attempt to discuss this class of preparations. Medical writers are almost unanimous in stating that there is no satisfactory, harmless remedy applicable to all or even a large percentage of cases of obesity, but despite this, there are specialists, institutes and companies galore who are rapidly becoming wealthy from the sale of remedies for the purpose, all of which, if we are to believe their promoters are "safe and reliable."

I shall, therefore, in handling this subject, occupy strictly neutral ground, stating the substances commonly used for the purpose of eliminating superfluous fat and the advantages and disadvantages of each, so far as information on the subject is available, without recommending any particular treatment. I may say, however, that beyond any question, the safest methods of treating obesity are those which depend upon careful attention to diet and exercise, combined with the use of such mineral waters as Vichy and Kissengen, preferably taken alternately.

Several prominent medical writers, notably Banting and Oertel, have devised very elaborate systems of removing surplus fat without inducing pathological changes. Details of these methods may be found in numerous works relating to the practice of medicine, but the routine is one which would scarcely recommend itself to the average obese patient, being rather irksome and requiring to be continued for a considerable time.

In the matter of diet, particular attention must be given to fat forming foods, such as starch, sugar and fats. Soups, rice, macaroni, butter, pastries, potatoes, beans, peas, etc.,

should be used in moderation, especial attention being given to not eating too much of any one kind. Bread should be taken dry, preferably as toast or gluten biscuit. Cereals are allowable in moderation, and fruits may be eaten freely. All food should be thoroughly masticated before swallowing.

Some difference of opinion exists regarding the use of water and other fluids, but practically all authorities are agreed that these should not be taken at meal time. Between meals, water, fruit juice, lithia water and similar drinks may be taken. A glass of water as hot as can be taken with comfort, an hour before or after meals is also recommended. Naturally, milk, cream, coffee, cocoa and other fat forming drinks should not be used. All alcoholic beverages are objectionable, light wines and cider being probably less so than any others.

Where the general health is such that Turkish baths may be taken without injury they are often found useful. Too many hot baths are likely to prove weakening, and when indulged in should always be followed by a cool spray or shower.

Among the remedies which have been highly vaunted as possessing great powers in the way of eliminating superfluous fat, bladder-wrack (fucus vesiculosis), a species of sea-weed, has attained the greatest popularity. Its effect is probably due to the iodine and bromine which it contains, the iodides possessing some reputation as an anti-fat. This is doubtless useful in certain types of obesity but sometimes causes derangement of digestion, and according to some authorities, eruptions of the skin.

Thyroid extract has also been extensively used in treating this disease, forming the principal portion of several highly advertised preparations. It is often very effective, but may exert an action on the heart which would be of serious moment to the patient. Phytolacca has been used

for years, but like most of the other remedies, proves entirely ineffective in many cases. When used for a considerable period it has a tendency to interfere with digestion and produce constipation.

Barkalow, a prominent medical writer, states that iodoform is highly effective but dangerous to use on account of its causing wasting and anemia; Ringer mentions alkalies, as solutions of the oxides or carbonates, as being of value in the reduction of flesh; and Waring recommends the use of a half a dram of the official liquor of potassium hydroxide in milk, three times a day.

Ammonium bromide has been used, but taken in sufficient quantities to produce the desired effect is likely to induce gastric catarrh. Another remedy which was used quite extensively at one time was adolis aestivalic, but its action on the heart and kidneys is such that it cannot be considered a safe remedy.

Probably as effective and harmless a treatment as could be devised, outside of the use of the mineral waters mentioned above, would be proper attention to exercise and diet, and as medicine, a tablet or capsule containing two grains of extract of bladder-wrack, taken two or three times a day. One-fourth grain of extract of phytolacca might be combined with the bladder-wrack with good effect.

A liquid remedy which has enjoyed considerable popularity in certain sections, is made as follows:

Extract of Bladder-Wrack	2½ pounds
Distilled Water	6 pints
Alcohol	1 pint

Dissolve the extract in the water by means of heat; add the alcohol after the mixture has cooled. The dose is a tablespoonful, taken three times a day.

A formula which is similar in effect to the mineral waters mentioned elsewhere, comes from a physician in charge of a prominent sanitarium, where the formula has been used

with good results. It consists of two preparations as follows:

No. 1.

Chloride of Soda	2½ drams
Phosphate of Soda	1 dram
Carbonate of Magnesia	½ dram
Sulphate of Magnesia	1¼ drams
Precipitated Carbonate of Iron	15 grains

Mix and keep in a closely corked bottle.

No. 2.

Bicarbonate of Soda	2¼ ounces
Muriate of Soda	22½ grains
Dried Sulphate of Soda	1½ drops
Dried Sulphate of Magnesia	1½ scruples
Dried Tartaric Acid	1½ ounces
Dried Sulphate of Iron	1½ grains

Mix well, and keep in a closely corked bottle.

The method of using is to take one to two tablespoonfuls of the powder, in a glass of water, three times a day, using No. 1 and No. 2 on alternate days.

The nomenclature in the above formulas is a little peculiar, but I give them exactly as received from the physician mentioned. The medicine is somewhat expensive but several parties who have used it report very favorable results.

Various preparations have appeared in the market from time to time, which have claimed to cure obesity when applied externally. Probably most of the virtues in the preparations resided in the fertile imagination of their promoters and in the rubbing or massaging attending their application. One of these which was sold under the name of Obesity Soap, was simply a mixture of ordinary white soap with sulphate of magnesia (Epsom salts.) Another remedy in pomade form, has the following composition:

Iodide of Potassium	3 drams

Lanolin	50 drams
Petrolatum	50 drams
Tincture Benzoin	20 drams

This is intended to be rubbed over the parts to be reduced, twice a day, with plenty of friction.

In the foregoing treatment of this subject I have laid before you practically the whole field of remedies used in the treatment of obesity. Any book on therapeutics will give the dosage of the various drugs mentioned, or the information may be obtained from a physician or druggist, so that if it is desired to make use of any of them, there is nothing to hinder one from doing so. I have already stated that I do not care to recommend any particular treatment, it having been my practice when called upon for information along this line to suggest proper exercise and diet, combined, possibly with the bladder-wrack and phytolacca in small quantities.

TABLET AND PILL MANUFACTURE.

Considerable interest has been aroused among manufacturers as to the possibilities of tablet and pill making on a small scale, by persons without a great amount of experience in the work. In regard to this would say, that in the majority of instances, it will be found advisable to entrust this work to some reputable firm of manufacturing chemists having at their command every facility for producing these preparations rapidly and economically.

It sometimes happens, however, that it is desirable to test out a particular preparation on a small scale before having it made up in sufficient quantities to justify placing an order with outside parties. The use of capsules offers one solution of this problem, but should it be deemed advisable to make up a small lot of tablets, a machine for doing the work may be obtained from dealers in pharmaceutical machinery at a comparatively low price. There is on the mar-

ket a small hand tablet machine, which may be bought for five dollars or less, and with such an equipment a thousand tablets may be turned out in a comparatively short time. This machine makes only one tablet at a time, the materials being placed in a receptacle provided for the purpose, the compressor inserted and a blow struck on this with a hammer. Other machines capable of doing more rapid work may be had at prices varying according to the capacity and particular construction of the machine.

As some information along the line of tablet manufacture seems to be desirable I have, after considerable investigation of the subject, decided to reprint two or three articles which have been written for the various drug journals. These have been prepared by parties having personal experience in the work and the information may be depended upon as being strictly reliable.

The first of these papers is reprinted verbatim, from The Druggist's Circular.

At a meeting of the Liverpool Chemists' Association, Mr. Edwin Thompson (Messrs. Thompson & Capper) read the following paper on tablet making:

"He insisted that in preparing the tablets too much attention cannot be given to the care of the machine. Should the material adhere to the dies, it must not be removed with a pocket-knife or anything sharp, but wiped off with moist cotton-wool, the punches and dies finally being rubbed with a little vaseline and carefully wiped clean. Unless the dies are perfectly smooth good work cannot be done. The ideal tablet should have a smooth surface and sharp-cut edges, and this cannot happen if the machine is not carefully attended to. There is no golden rule to success in tablet making, but there is no reason for failure, and it only takes a little experience to become an expert tablet-maker.

"Preparing the material.—The material to be compressed should be in a finely granular form, and most substances

will probably have to be reduced to a powder first and granulated afterwards. A small quantity of syrup and water is generally sufficient to granulate, but it is sometimes necessary to have an adhesive in order to make the tablets bind well. The dispenser will know by experience in pill-making whether it is best to add acacia, tragacanth, dextrin, wax, glucose or syrup. A tablet made with sugar is more soluble than one made with acacia, etc., so that sugar is in most cases preferable. The damp material is passed through a sieve (a No. 20 mesh is the most useful size), and then dried and again passed through a sieve. A lubricant is next added to enable the powder to pass through the machine freely. The most useful lubricants are talc (1½ to 2 per cent.), 2 per cent, solution of white soft paraffin or vaseline and ether sprayed onto the powder before compression, lycopodium, starch, and in some cases where a completely soluble tablet is required—as in hypodermics and photographic tablets—powdered boric acid will be found useful. When the lubricant is a powder it should be sifted on to the material spread out on paper and lightly stirred so as not to break the granules. A little starch greatly facilitates rapid disintegration of the tablet, whereas glucose and water tends to form a hard tablet—an advantage when the tablet is to be dissolved slowly in the mouth."

The glucose may be incorporated by first mixing it with the emulsion in a mortar.

Good granules possess a certain degree of stability, showing no tendency to break down into powder under manipulation. When defective in this quantity, gum acacia should be added in the proportion of 5 to 10 per cent.

The following formula is improved in this way:

Reduced Iron	16 parts
Gum Acacia	2 parts
Starch	1 part

Sugar	4 parts
Theobroma Emulsion	2 parts

The addition of gum acacia to the formula for Hutchinson's pills given in the previous paper is an improvement. Gum acacia is a necessary ingredient also in the formula for iron tablets, which will be given later; as might be expected, the presence of a dehydrated salt interferes considerably with the operation of granulation.

In applying the ether-alcohol form of the excipient two modifications are recommended for use on occasion: (1) The substitution of a weaker alcohol when granulation produced with the stronger alcohol is imperfect. The modification is employed in the following formula:

Opium	16 parts
Sugar	7 parts
Ether-theobroma	3 fl. parts
Alcohol (60 per cent.)	2 fl. parts

Mix the powders and add the liquids separately.

This modification can be adopted in most, if not in all cases, when from the nature of the material the use of the aqueous emulsion is indicated; since the granules prepared with the ether-alcohol excipient can be more quickly dried, a saving of time is in this way possible. (2) The reduction, in some cases, of the proportion of alcohol. The use of a volume of 90 per cent. alcohol equal to that of ether-theobroma frequently necessitates the addition of a considerable proportion of sugar, which can be reduced if this modification is adopted. The following is an extreme example:

Cascara Extract	16 parts
Ether-theobroma	3 fl. parts
Alcohol (90 per cent.)	0.5 fl. parts

In the formula for cascara given in the previous paper 50 per cent. of sugar was necessary, in order to avoid overgranulation. In such cases as the above a little starch can be added with advantage.

If the drying of granules is carried out in a room which is fairly warm and dry, the application of heat will seldom be necessary. In no case is it necessary to subject the material to a higher temperature than 45° C. No rule can be laid down, even in particular cases; but, seeing how seldom heat is necessary, it is advisable, first, to try drying by exposure to the air. There is the danger with some substances of over-drying, thereby reducing the cohesiveness of the material. The weight of the dry granules will depend considerably upon the temperature at which drying has been conducted, especially if starch or such a crystalline substance as lead acetate is an ingredient of the mixture. To insure accurate dosage it is necessary in all cases to weigh the finished granules, adjusting the weight of the tablets accordingly. Two samples of ordinary starch powder heated in a water-oven were found in each case to lose 10 per cent. of their weight; a similar loss resulted at a temperature of 45° C.

Disintegration.

To bring about rapid disintegration of tablets which are composed largely of insoluble substances, 5 per cent. of starch powder should be added, applied either by dusting it over the dry granules, or, better, by adding it to the material before granulation. The addition of starch before granulation makes it necessary to add a larger proportion of the excipient; this is generally beneficial, the extra lubricant improving the finish of the tablets; this addition can be frequently made with advantage. The following formula for gray powder is an improvement on that given in the former paper. The extra lubricant makes it possible to produce tablets with a good surface by the application of a low degree of pressure.

Gray Powder	16 parts
Starch	4 parts

Sugar	20 parts
Theobroma Emulsion	4 parts

Compression.

In adjusting the degree of pressure due regard must be paid to disintegration. Increase of pressure *does* add to the good appearance of the tablets, improving the polish of the surface, and, when the tablets are colored, making them darker and apparently more homogeneous in composition, but, unfortunately, with a corresponding increase in the time taken by the tablets to disintegrate. Good finish, with the minimum pressure is, however, possible, and its achievement should be constantly aimed at.

One of the difficulties sometimes encountered is the cracking of the tablets after compression, but only in cases of imperfect granulation; it may, however, be caused by the presence in the material of coarse particles, especially crystals. This should be carefully avoided; all the ingredients should be in the finest possible powder. This is necessary also in the case of colored tablets, if an appearance of homogeneity is desired.

Another difficulty sometimes met with is the adhesion of the material to the punches during the compression; it results from the lack of cohesiveness in the material, the remedying of which has already been discussed. Should adhesion occur when granulation is satisfactory, showing generally that the material is sufficiently cohesive, the remedy will usually be found in more perfect drying. Various methods of correcting adhesion have from time to time been suggested, such as the addition of talc to the dry granules, or by spraying them with an ethereal solution of liquid paraffin, these substances serving also as lubricant. Talc, in very fine powder has been found useful in cases of emergency, when time did not permit of more elaborate treatment; but its general use as a lubricant is not recommended,

since it increases the liability to crack. If granules prepared with theobroma are found to require additional lubricant, 0.5 per cent. of talc will usually be sufficient. When talc is added to correct adhesion, as much as 2 per cent. may be necessary; this proportion should not be exceeded. Talc is most economically applied as follows: Spread the granules in a thin layer on paper, and sift the talc over the surface, using a very fine sieve; mix thoroughly by lifting the corners of the paper, and complete by rotating in a large flask or bottle. In case of adhesion the punches should be washed with water, the lower punch being first removed for the purpose. If the punches are not kept well polished the difficulty will frequently arise from that cause; when not in use they should be immersed in liquid paraffin or paraffin oil.

As a result of further experimenting on iron tablets, the following formula has been adopted as a substitute for pilula ferri, B. P.:

I.

Dried Ferrous Sulphate	150 parts
Gum Acacia	25 parts
Sugar	125 parts
Theobroma Emulsion (Acacia)	60 parts

Granulate and dry thoroughly by the application of heat.

II.

Sodium Bicarbonate	150 parts
Theobroma Emulsion (Acacia)	35 parts

Granulate and dry thoroughly with heat, and mix two parts of I. with one part of II. Each 5-grain tablet yields on moistening 1 grain of ferrous carbonate.

Theobroma emulsion, prepared with gum acacia, is preferable in this case to one made with soap; the above calculations are based on one giving a 40 per cent. residue on drying. Absolute drying of the granules is necessary, otherwise the reaction between the salts takes place to some ex-

tent, and oxidation ensues. Tablets made from the above formula have been exposed for three months to the trying atmosphere of the general laboratory, without any further change than a slight discoloration of the edges; some of the same batch were coated and have kept perfectly. If it is wished to obviate the labor of coating, which is really not necessary, so far as their keeping properties are concerned, it should not be difficult to find some suitable coloring substance, which might be incorporated before granulation. It is also necessary to examine carefully the dried ferrous sulphate, as many commercial samples do not comply with the official requirements.

The formulas for the theobroma preparations as given in Pharmaceutical Formulas, are as follows:

Theobroma Emulsion.

Oil of Theobroma	4 ounces
Hard Soap	350 grains
Tragacanth, in powder	35 grains
Benzoic Acid	17½ grains
Distilled Water	Enough

Dissolve the soap in 4 ounces of water by the aid of heat; add the hot solution to the oil of theobroma, previously melted; and mix by agitation; then shake in the tragacanth, add the benzoic acid, and make up to 16 ounces with water.

This is to be triturated with the substance to be compressed (the latter having first been reduced to a fine powder), and the whole passed through a No. 20 or No. 30 sieve and exposed to the air a few hours before being put into the compressing machine. Gum acacia may be used in place of the soap.

Ether Theobroma.

Oil of Theobroma	1 fl. ounce
Ether	6 fl. ounces

Dissolve and add an equal volume of alcohol, as required for use.

This is triturated quickly in a mortar with the substance to be compressed, the whole of the solution having been added at once. It is generally best to let the granules stand for an hour or two after sieving.

The following paper on coating compressed tablets, is reprinted, by permission, from The Pharmaceutical Era. This takes up the process as used by manufacturers producing tablets on a large scale but with slight modification will apply equally well to the coating of small lots of tablets.

"Compressed tablets are coated to make them palatable, to conceal the bitter taste and odor that many drugs possess, and to improve the finished appearance of the tablet. The coating also prevents chemical changes by excluding air, renders the tablet more slowly soluble, or even insoluble in the stomach, so that it may pass on to the intestines, where it is dissolved by the alkaline juices. After the tablets are compressed they should be placed in a coarse mesh sieve over a suction blower or cold air blast. This removes any adhering powder and particles or dust from their surface. This is necessary, particularly if a transparent coating is to be applied. If, after compressing, the tablet has a mottled or variegated appearance, cover it with a little moist lampblack so that the color will be uniform when coated.

Before a tablet can be successfully coated it must be in perfect condition. Not too soft nor too hard, but firm and tenacious, with regular and well formed edges. Hard tablets are often insoluble and give rise to capping when the coating is applied. They must have the proper shape and be perfectly dry, and the excipients used in the granulation of the ingredients must not be of a hygroscopic nature, as they are apt to attract moisture from the coating and cause the tablet to swell, crack or burst open on standing any length of time. They must be dry enough so that moisture

will not exude and cause the coating to become softened or dissolved. All tablets intended to be coated should be placed on fine wire or cloth trays and dried at 70° F. for at least 24 hours.

Again, the ingredients should have a fairly good amount of cohesion, to enable them to stand the rough motion of the tablets in the coating drums. Syrup, being adhesive, will cause the surface of the tablet to adhere to the thin layer of coating, the adherence increasing as the syrup dries, and if this adhesiveness of the drying syrup is greater than the cohesiveness of the granules, the structure of the tablet becomes strained and the coating cracks. Proper shape is another essential feature for good coating. Too flat tablets offer a greater surface and increase the danger of the tablets sticking to one another. Thick edges should be avoided, as they require a long time to build up and round over the coating.

Sugar Coating.

"The tablets are placed in a revolving copper drum, and a small amount of syrup is added, only enough to slightly moisten the surfaces. Into each drum a current of warm or cold air is introduced which dries the syrup on the tablet, this process of wetting with syrup and drying being repeated until the coating reaches the desired shape, thickness and smoothness. The rolling motion of the coating drums distributes the syrup evenly over the tablets, and prevents them from adhering to each other. After the required number of applications of syrup are added, another solution is applied, to which is added the coloring and flavoring material desired. After drying the tablets are placed in a second drum lined with thick felt, the friction of the felt and the previous layer of coating imparting to the surface a dull polish. From the felt lined drums the tablets are placed in revolving pans lined with melted paraffin wax, which gives them a highly polished and bright appearing surface. The

hot air blast is preferable to the cold air process for it dries the syrup, the more rapid evaporation of the moisture rendering the drying of the coating more uniform and less liable to crack and shrink away from the surface of the tablet when it becomes dry.

Gold and Silver Coating.

"This form of coating is more often applied to Italian mints, cachous and dragees than to tablets in general. The tablets or other material should first be covered with a little weak mucilage and then shaken with the gold or silver leaf. The leaf may be dropped inside the revolving pan and it at once adheres to the surface of the tablets. This operation must be continued for some time, and a second coating is often necessary to give the tablet a bright and smooth appearance and to conceal the color of the tablet or coating applied thereon. Aluminum leaf may be used for the first coating, being afterwards covered with silver leaf. The pills or tablets thus coated are just as bright, and the cost of material is reduced. To give the silver coating a bright metallic polish the tablets are placed in a pan or drum lined with chamois skin and revolved for about one-half hour. If the tablets contain any sulphides they must first be coated with tolu or sandarac to prevent the formation of silver sulphide, which causes a black discoloration.

Pearl Coating.

"This is similar to sugar coating, but the coating contains a large proportion of powdered soapstone or talcum, which gives the tablets a pearly appearance.

Chocolate Coating.

"To flavor chocolate coated tablets, place ten pounds of cocoa hulls in a cotton bag and boil for five minutes in four gallons of water. Strain through layers of cheesecloth and add twenty-five pounds of lump sugar. To this mixture add two pounds powdered cocoa and mix well.

"For extemporaneous coating, moisten with mucilage, roll in cocoa powder, then rotate in a pill box with a little grated cocoa butter while slightly heating. This gives the desired polish.

COLORS FOR COATING TABLETS.

PURPLE.

Germania, blue, Atlas brand	2 drams
Kaline red, Atlas brand	2 drams
Brilliant rose, Atlas brand	1 ounce
Alcohol (25%)	8 ounces

BLACK.

Sulphate of Iron	4 pounds
Fluid Extract of Logwood	1 gallon
Fluid Extract of Nutgalls	1 gallon

YELLOW.

Amberine Yellow	4 ounces
Boric Acid	½ ounce
Alcohol	16 ounces
Water	48 ounces

ROSE PINK.

Red Saffron, powdered	2 ounces
Alcohol	4 ounces
Water	16 ounces
Boric Acid	½ ounce

CARMINE ROSE.

Alcohol	8 ounces
Carmine Rose	2 ounces
Hot Water	8 ounces

TOOTHACHE REMEDIES.

These are usually compounds of oil of cloves, creosote, etc., with various other substances, and are designed to be applied to the cavity of the tooth on a bit of cotton after thoroughly cleansing the cavity. Sometimes the remedy is put up in wax or stick form, in which case it is used by

warming a bit of the substance and pressing it into the cavity of the tooth.

The liquid preparations are commonly sold in one or two dram bottles at prices ranging from ten to twenty-five cents per bottle.

I.

Creosote	10 drams
Oil of Cloves	10 drams
Oil of Peppermint	10 drams
Oil of Camphor	12 drams
Carbolic Acid	12 drams
Chloroform	10 drams

Mix all together, adding the carbolic acid last.

II.

Creosote	10 drams
Chloroform	10 drams
Oil of Cloves	10 drams
Camphor—Phenol mixture	10 drams

Mix well.

The camphor-phenol mixture is made by powdering 5 ounces of camphor and pouring over it 1½ ounces of melted carbolic acid crystals. Stir until it liquefies, then filter.

The camphor may be easily powdered by dissolving in the smallest possible quantity of alcohol and then evaporating the solvent by rubbing in a mortar with the addition of sufficient alcohol to prevent its "gumming" under the pestle.

This formula is really a modified form of No. 1, and is generally considered superior to it.

III.

Toothache Jelly.

Carbolic Acid	8 ounces
Menthol	1 dram
Thymol	1 dram

Collodion sufficient to form a smooth jelly

This is best mixed in the bottles in which it is to be sold. Dissolve the menthol and thymol in the carbolic acid, fill the bottle about half full of this mixture and then fill up with collodion.

Directions for use are the same as with the foregoing.

Toothache Wax or Gum.

IV.

The base of this preparation is yellow wax or paraffin, with which has been melted sufficient Venice turpentine to give it the needed plasticity and prevent crumbling. About three parts of wax to one of turpentine will give a product which will remain plastic indefinitely and these proportions may be varied to give any desired consistence. In medicating this, any of the above described remedies, with the exception of No. 3, is suitable, and the mixtures may be added in such quantities as are desired. Other substances which may be used in medicating this wax are chloral, camphor, menthol, oil of cloves, creosote or chloretone, either singly or in combination.

A good working formula would be:

I.

Base	10 ounces
Oil of Cloves	2 drams
Creosote	2 drams
Camphor-Phenol mixture	4 drams

Melt the base and add the oils, etc., while cooling stirring to form a smooth mass.

II.

Paraffin	4 ounces
Burgundy Pitch	2 pounds
Oil of Cloves	1 ounce
Creosote	1 ounce

Melt the paraffin and pitch together and when nearly cool add the oil and creosote and mix well. Roll out in a

thin sheet and cut in pieces of the required size. If the mass is too hard it may be softened by the addition of a little Venice turpentine, which should be melted with the pitch and paraffin.

This is usually cut in strips about one and one-half inches long and an eighth of an inch wide. Several of these pieces are placed in a homeopathic vial with a printed label. The vial should be tightly corked, it being best to have the top of the cork flush with the neck of the vial and then dip in melted paraffin. Instead of a carton, wrap the vial in a piece of corrugated paper and outside of this with a printed wrapper.

SECTION VII

HOUSEHOLD SPECIALTIES.

Under the head of Household Specialties, we may consider such preparations as Baking Powders, Flavoring Extracts, Bluings, Insectides, Polishing and Cleansing Preparations and such other products as find use in or about the home.

It is a little difficult to draw the line sharply between the different classes of specialties and the classification made in this volume is one of convenience rather than of necessity. As an example, metal polishes, which are largely used in the home, find many outside uses, and the same is true of numerous other products. Therefore in looking for a particular subject, it will be found advisable to consult the index rather than to depend upon its being found under the particular head where it might seem to belong.

BAKING POWDER.

At just what period in the development of the human race man began the cultivation of wheat and the other cereals it is impossible to say, but that this was among the earliest developments of civilization is proven by the fact that we find reference to these grains among the earlist records which have come down to us and the discovery of apparatus used in the production of flour from grain on the sites of ancient dwellings proves that the manufacture of this important foodstuff was carried on at a very early period.

The first forms of bread were doubtless made by simply

mixing the flour with water and baking, the "unleavened bread" of Scripture being produced in this manner, but in some way, probably as the result of accident, it was found that by using a leavening agent, a bread would result, which, from the standpoint of palatability and digestibility, was a decided improvement over the hard, tough compact product of flour and water only. The use of yeast for this purpose is almost as old as the art of baking itself.

Yeast, by its action on the hydrocarbons of the flour, generates large quantities of carbonic acid gas which in its efforts to escape from the mass produces the desired lightness in the bread. But this liberation of gas takes place slowly and the conditions of modern life together with the desirability of producing various other articles of food which largely take the place of bread have rendered it necessary to have recourse to aerating agents which are more rapid in action. As early as 1859, one Dr. Daughlish, an English physician, invented a method of aerating bread by means of charging the water used in making up the dough with carbonic acid gas, and conducting the mixing under pressure in a closed vessel. As soon as the dough was removed from the vessel, the gas contained in it expanded, causing it to rise. It is evident that such a method could never prove practical in common use and therefore attention was directed to the finding of some substance which would bring about the desired effect in an easier manner.

The housewife solved the problem by making use of sour milk and carbonate of soda, the free lactic acid of the milk, liberating the gas from the carbonate, but as sour milk was not always available the desirability of finding some chemical agent which would replace it was evident and the modern Baking Powders were the result of the experiments made in this direction.

All baking powders, regardless of their composition, depend for their effect upon the same principal, i. e., the lib-

eration of carbonic acid by the action of some acid upon an alkaline carbonate. The alkaline portion of practically all powders is the same—bicarbonate of soda.

Carbonate of ammonia has been to some extent employed. This substance is solid at ordinary temperatures, and is converted into gas by the heat in baking, but is not, alone, suitable for baking powder, because it may easily remain to some extent in the bread after baking, imparting to it not only an unpleasant taste, but possibly, even probably, unwholesome properties.

Several different substances are used to produce the acid effect, and from the acid used the powders take their names, as Tartrate Powders, where the acid ingredient is tartaric acid or cream of tartar; Phosphate Powders where the acid ingredient is acid phosphate or lime; Alum Powders, where the alum is used as the acid ingredient, and Alum-Phosphate Powders, where the acid portion consists of a combination of alum with acid phosphate of lime.

As the effect of any baking powder is dependent upon the amount of carbonic acid gas it is capable of producing, it is evident that the best powders are those which are capable of producing the largest possible quantity of this gas from a given weight of the powder used. Theoretically, a perfect baking powder would consist only of the acid element and the alkaline carbonate in exact molecular proportions, but such powder is not practical, owing to the fact that the ingredients used would react in such a way that the strength of the product would be destroyed in a short time. In order to prevent such action, a filling of some inert substance, such as starch, is essential in order that the powder may be kept for a considerable length of time without deterioration. The substance most often used for this purpose is corn or potato starch, although in some of the cheaper grades of powders wheat flour is employed.

The requisites of good baking powder are:

I. That the ingredients, in the quantities used, shall not injure the health of the consumer.

2. That the powder shall yield the largest amount of gas that can be obtained from wholesome ingredients, and in such a way as to produce the best effects. Boiled with water, it should give a neutral, or very nearly neutral solution.

3. The powder shall keep its strength, and also not cake or become lumpy under the ordinary conditions of storage and use.

The caking of the powder is due to the fact that some of the active ingredients are often of such a nature as readily to absorb moisture from the air, so that they partly dissolve, and not only cause caking, but also loss of "strength" through the escape of carbonic acid gas.

Cream of tartar powders cannot be made to keep well if beyond a certain strength, ranging from 13 to 14 per cent. of carbonic acid gas. Alum powders could be made twice as strong, but generally they are not; the very object of using alum being to lessen the cost of manufacture.

This trouble is greatly reduced by the use of well dried materials and by the addition of dry starch powder, wheat flour or similar farinanceous substance, so that a well made powder loses very little strength. In good cream of tartar baking powders, about 20 per cent. of such a "filling" body is often used. More than this is unnecessary and simply lowers the cost of the product. A little less is sometimes used. In the majority of alum powders the strength is only one-third or one-half what it might be, and in many cases this is, no doubt, due to the excess of the starch or flour thus sold at the price of baking powder. It would seem that the strength of the powders is purposely kept down to a standard that will permit the use of the customary "two teaspoonfuls."

Cream of Tartar Powders.

Cream of tartar is a natural constituent of grape juice, and probably no material has ever been devised for making baking powders that is open to less objection than cream of tartar, unless possibly the acid phosphates.

To decompose 40 grains of bi-carbonate of soda requires 89.5 grains of cream of tartar. After the carbonic acid gas has been expelled, there remains in the bread 100 grains of the double tartrate of potash and soda—the drug known as Rochelle salts. Most exaggerated statements have appeared in the newspapers relating to the physiological action of this salt, but it is one of the mildest used in medicine, and its taste is comparatively feeble. Stille and Maisch (National Dispensatory, 2d edition) say: "In doses of one-half ounce to one ounce (240 to 480 grains) it acts as a gentle and cooling laxative, and seldom disagrees with the stomach." As a purgative, the dose is one ounce. It is the active principle of the seidlitz powders, so often taken as a mild form of medicine.

In consuming the equivalent of a half a loaf of our bread, one would take about fifty grains of Rochelle salt.

Acid Phosphate of Lime Powders.

The acid phosphate of lime (also called superphosphate of lime) has of late been much used in baking powders and there seems to be no physiological objection to its use. Indeed, it is claimed that its use restores to the finest wheat flour the phosphoric acid which is so necessary to our health, and which has been in great part removed with the bran.

This claim would have more weight if there were not ample sources of phosphoric acid in other forms of food, and if the quantity introduced by a baking powder were not much greater than is required to make up the loss in the bran, and greater than is required by the system, unless in those cases where its therapeutic use is indicated.

When the acid phosphate acts on the bi-carbonate of soda there is formed phosphate of soda, soluble in water, and insoluble phosphate of lime, the latter being, however, more or less soluble in the various fluids of the digestive organs. The acid phosphate is well adapted for baking powders, because it liberates a part of the carbonic acid quickly and the rest only on heating. Being a very hydroscopic substance, the acid phosphate powders need to be very carefully prepared and secured from moist air, or they will rapidly deteriorate. Other acid phosphates have been employed to some extent, but the acid phosphate of lime far the most widely.

Unless properly prepared, the acid phosphate may not be so unobjectionable a substance. It is made by acting upon ground bones with sulphuric acid. The result is sulphate of lime and the acid phosphate of lime. If now the latter, which is freely soluble in water, is leached out, leaving the sulphate of lime behind, we have the acid phosphate in fit condition to be used. It is mixed with starch, dried and brought into the market as cream of tartar substitute. (C. T. S.)

Frequently, however, the sulphate of lime is left with the acid phosphate, and will then bring about any ill effects that may justly be attributable to the sulphate. Moreover, unless the sulphuric acid used has been carefully purified, it may bring no inconsiderable quantities of lead and even arsenic into the baking powder.

Sequi-Carbonate of Ammonia.

Carbonate of ammonia used in small quantities, is perhaps unobjectionable, but probably if any considerable quantity were employed, disagreeable physiological effects might be expected, irrespective of the unpleasant odor and taste that the ammonia compounds would impart to the bread, which always shows ammonia reaction, even when small

quantities only were used in making it. The ammonia salts in general, appear to be much more irritating and stimulating than the corresponding soda, or even potash salts. Stille and Maisch say of carbonate of ammonia: "It is irritant, and if long continued, even in doses which the stomach will tolerate, it impairs nutrition." In doses of five to ten grains it increases the fullness and force of the pulse, and causes a sense of tightness in the head. It is a very powerful agent, the ordinary dose being two to ten grains. Evidently such a substance needs to be used with care in food products.

Alum Baking Powders.

Of late years the alum baking powders, being more cheaply made, have come into extensive use, and have met with considerable opposition on the score of qualities alleged to be injurious to the health.

A great deal of testimony for and against the use of alum in baking powders might be collected. In some states the use of this substance is forbidden by law. In states where its use is allowed, the laws generally require that the label must state the composition of the powder. Full information on this subject may be obtained free of charge by addressing an inquiry to the Dairy and Food Commission of the several states, at the state capital.

The alum used is now almost exclusively burnt ammonia alum; and since the potash alum is more expensive, the same is probably true of alum baking powders in general.

The crystallized alums are less frequently employed, because they are too easily soluble; but they may be used in connection with the burnt alum, to secure at first a more rapid escape of carbonic acid gas. "Burnt alum" is alum deprived of its water of crystallization by gentle heating, and it dissolves very slowly in cold water.

To decompose 40 grains of bi-carbonate of soda requires 38.1 grains of burnt ammonia alum. The residue contains

very nearly the equivalent of 8 grains of dry ("anhydrous") alumina, nearly equal to 72 grains of crystallized ammonia alum, or 74 grains of crystallized potash alum (ordinary alum.

The alumina is present in the bread, partly as hydrate and partly as phosphate of alumina, in case simple alum baking powders are used. Where acid phosphates are also used in sufficient quantity, the alumina remains in the bread as phosphate.

In preparing the foregoing, I have drawn freely upon the reports of government investigation of baking powders, including those of the United States and Canada, as well as the work of the Dairy Commissioner of the State of New Jersey.

BAKING POWDER FORMULAS

I.

Cream of Tartar	2 pounds
Bicarbonate of Soda	1 pound
Corn Starch	1 pound

Reduce all to a fine powder, dry the cream of tartar and bi-carbonate of soda by gentle heat and then mix thoroughly by sieving.

This represents the highest type of a pure tartrate powder. The cost of producing this in reasonable quantities will not vary far from twenty cents per pound, the exact cost depending to some extent upon the quantities in which materials are purchased and the ratio of the quantity of starch used to the other ingredients.

The quantity of starch is, to a great degree, optional with the manufacturer. It should be kept in mind, however, that this is an inert substance and that all that is added above what is actually required to prevent chemical action between the acid and alkali reduces the leavening strength of the powder as well as the cost.

The same suggestion applies as well to the following formulas. In these the proportion of starch stated is so proportioned as to obtain the greatest possible strength consistent with good keeping qualities. The manufacturer is expected to use his own judgment in the matter of increasing the amount of filler used.

II.

Tartaric Acid	1 pound
Bicarbonate of Soda	1 pound
Starch	1 pound

Powder finely, dry well and mix intimately.

This class of powders is now seldom used, cream of tartar having replaced the tartaric acid in most of the modern powders.

III.

Acid Calcium Phosphate	1½ pounds
Bicarbonate of Soda	1 pound
Starch	1¼ pounds

Mix as directed for the preceeding formulas.

This formula gives what is commercially known as acid-phosphate powder. It should be noted that the acid phosphate of lime is not that prepared especially for medicinal use and which is quite expensive, but a grade prepared for use as cream of tartar substitute in baking powders, costing about ten cents per pound in barrel lots.

IV.

Dried Ammonia Alum	1 pound
Bicarbonate of Soda	1 pound
Starch	1 pound

Mix as directed for the preceeding formulas.

This is the "alum" powder generally sold. It is of fair leavening power, and may be produced at a very low price.

V.

Acid Calcium Phosphate	2 pounds

Dried Ammonia Alum	2 pounds
Bicarbonate of Soda	3 pounds
Starch	5 pounds

Mix as directed for the preceeding formulas.

This gives us the "alum phosphate" powder which is probably more largely sold than any of the other kinds. It makes up at a low cost and is used largely with many premium schemes.

In making baking powders on a small scale, an ordinary flour sifter (what is commonly known as the Hunter sifter) may be used. Where it is made in large lots, special machinery for sifting and mixing should be employed. These sifters and mixers may be had from any dealer in pharmaceutical machinery at a reasonable price and are made to be operated by hand or power.

With no further apparatus than an oven for drying the materials and one of the self sifting flour bins, made of heavy tin and provided with a sifting mechanism at the bottom, several hundred pounds of powder may be produced in a day.

For putting up the powder for sale, tin cans of various sizes ranging from one-fourth pound up to five pounds are generally used. One or two parties have done well with the powder put up in the ordinary self-sealing glass fruit jars. While these are more expensive than a tin can, they make a very attractive package and the fact that the jar is useful after being emptied makes a good inducement to the purchaser. Tin cans of any desired size may be had from any firm manufacturing tin boxes, etc.

The laws of the different states vary considerably regarding the kind of materials which are allowable in baking powders and the statement of the materials used on the label. Before embarking in the manufacture of this class of products, it is always advisable to familiarize yourself with the laws of your own state regarding the matter, as

well as with those of such other states as you intend to do business in. Information of this kind may be had from the Secretary of State, the Attorney General or the Board of Dairy and Food Commissioners at the various state capitals.

METAL POLISHES.

The manufacture of Metal Polishes is a very old industry, probably extending back to the days when mankind first began to make use of the different metals and finding that they tarnished and lost their lustre by exposure to the air, began looking about for something which would restore the surface of such metallic articles as he used, to its former appearance. Observing that the metal tools which he used for agricultural purposes became polished by contact with and friction from the soil, the idea of using powdered earth as a polishing agent for his weapons and ornaments naturally suggested itself.

During the ages but little improvement was made along this line until some genius became impressed with the idea that by mixing the powdered abrasive agent with some oil or grease a product might be made which could be more easily handled and be less likely to scratch the surface to which it was applied. Thus arose the so-called "paste polishes" which are now almost as numerous as the "sands of the sea." With the discovery of methods for refining petroleum, the residue from this operation, a crude form of petrolatum, began to be used as a vehicle for the polishing agent and the putz-pomades or German polishing pastes came into existence. Many of the polishes now on the market make use of petroleum or some of the by products of the refining of this substance as a base.

All polishes, except those in powder form, consist of a base or vehicle combined with some abrasive agent. This abrasive agent varies from an almost impalpable powder, used in polishes for fine silverware and jewelry, to such

coarser substances as pumice or powdered scouring brick for use on the coarser kitchen utensils and such other articles as do not have a finely polished surface where slight scratches would be apparent.

The base of the polish is a matter of considerable more importance than would be naturally supposed by one who has merely thought of it as a medium for holding the polishing agent in a convenient form for use. It does far more than this and should be of a nature which will keep indefinitely without drying up or becoming hard, must not be sticky or difficult to remove from the article after cleaning and last but not least, must be of a nature that will not injure by chemical action, the surfaces to which it is applied.

In some instances, the composition of this base or vehicle has much to do with the action and effectiveness of the polish. For example, certain forms of brass polish are made with a base into which oxalic acid enters as an ingredient. This acid has a strong affinity for the verdigris which forms upon the surface of brass when exposed to the air and by dissolving it adds materially in giving a quick acting polish. It is self evident that the use of this material with an alkaline (soap) base would be useless, on account of the alkali, neutralizing the acid. Ammonia is another substance which is largely used in polish bases and is well adapted to use on surfaces which are likely to be greasy, the alkaline ammonia converting this grease into a kind of a soap thus rendering it soluble and easily removed. Alcohol, gasoline and various other substances are also used in polishes for greasy surfaces and act by dissolving away the grease and making it possible for the abrasive agent to come in direct contact with the metal.

It is self evident that the nature of the abrasive agent used, must vary with the purpose for which the polish is intended and it requires no abtruse reasoning to understand that a polish which would be entirely suited for brightening

coarse tinware and tarnished iron and steel implements would prove destructive to the finely finished surface of silverware and fine jewelry. Both the base and the polishing agent should be adapted to the purpose for which the polish is intended and anyone who intends putting out anything like a complete line of metal polishes will find it necessary to manufacture several different varieties.

A wide variety of substances are available as abrasive agents in the various forms of metal polishes and we shall now consider briefly some of these which are in common use.

Chalk is a native, friable calcium carbonate found in many parts of the world. It appears in commerce in its crude form and also as prepared chalk, which is simply common chalk freed from its impurities by washing with water and allowing the coarser particles to settle to the bottom of the vessel in which the washing is done. The water, containing the finer particles, is poured off and the residue washed again in the same manner. The liquids from the two washings are now mixed and the finely divided particles held in suspension are allowed to subside, the water poured off and the resulting powder dried and then ground in a paint mill or similar machine. Prepared chalk is suitable for polishing fine surfaces and in combination with other materials enters into the composition of many different polishes. Being an alkaline carbonate this substance is not adapted to use in connection with acids on account of the effervescence which results from such combinations, and when mixed with them in solutions the resulting chemical action destroys the characteristics of both substances.

Whiting is simply a cheap prepared chalk, generally being of a grey or dirty white color. It is used for practically the same purposes as the better grades of the prepared chalk but not being as well purified is more likely to scratch the surfaces to which it is applied.

Calcium Sulphate.

This substance is well known under the name of gypsum or plaster of Paris. By calcining the water is driven off and when it is again mixed with water it absorbs this in considerable quantities, and soon sets up into a hard mass. For polishing purposes the crude un-calcined sulphate is used or else the powder is mixed with water, allowed to harden and re-ground. In action it is similar to chalk and the latter substance may be substituted for it in all formulas where it is called for, without impairing in any way the effectiveness of the polish.

Tripoli is an earthy substance taking its name from the locality where it was first observed as occuring naturally. It has a fine hard grain and does not soften in water or mix with it. Under the microscope it is found to consist almost wholly of the shells of animalicules. In action it is similar to silex, although not as harsh, and used with a suitable base makes a good general purpose polish.

Silex, or silica, occurs in nature combined with earths and in the form of sand, flint, quartz, etc. As used in polishes it is generally prepared from calcined flints or quartz ground to a powder. It possesses very sharp cutting properties and is therefore suitable for use in such preparations as are required to act quickly on surfaces where the minute scratches which it makes are not of particular importance.

Marble Flour is prepared by grinding ordinary marble to powder. It may be had in various grades of fineness and is similar in action to chalk.

Ferric Oxide, crocus martis or jeweler's rouge, as the latter name implies is largely used in polishing jewelry and similar articles. One objection to its use is the color, a deep red, which gives a dark color to any mixture in which it may

be used and soils the hands of the user and the cloth or other fabric used in applying it.

Infusorial Earth.

This substance is worthy of the most careful attention of the would-be compounder of metal polishes. It is the ingredient to which most of the highest grade preparations on the market owe their excellent qualities. The Century Dictionary describes it as follows:

"Infusorial earth, a very fine white earth, resembling magnesia, but composed largely of the microscopic silicious shells of the vegetable organism called diatoms. Deposits are found not infrequently under peat beds and also on a large scale in certain parts of the United States, especially in the western part of the Great Basin, Nevada, Oregon and California, where there are masses of rock hundreds of feet in thickness, largely made up of infusorial earth, occuring usually interstratified with volcanic materials, and often in connection with a fine grained white ash, from which the infusorial beds are not easily distinguished by the eye. This earth is used for polishing articles of metal and as an absorbent in making explosives with nitro-glycerin. Also called infusorial silica and fossil flour and sold in the United under the trade name of Electro-silicon."

This substance is also known by its German name, Kieselghur, and is adapted to the manufacture of almost every variety of metal polish. Being very light it does not form in a hard mass when used in liquid polishes. This quality makes it superior to chalk and similar substances for this use, and furthermore, its polishing powers are fully double those of chalk while it does not scratch the most delicate surfaces if a fine quality is used.

Until quite recently it has been difficult to obtain a fine grade of this substance in the open market, owing to the fact that most of the better quality was bought up by the large

firms engaged in the production of metal polishes, but with increased production and the opening of new sources of supply, it is now possible to obtain a most excellent quality at an extremely low price.

Pumice, or pumice stone, is a form of lava which when ground to powder is frequently used for polishing purposes. Owing to its sharp cutting power and the impossibility of reducing it to an impalpable powder, it is adapted only for coarse work.

Emery.

This substance appears in commerce in the form known as emery flour in varying grades of fineness. It is unsuited for use in fine polishes owing to its sharp cutting properties.

Carborundum.

This is a comparatively new product in the line of polishing agent. It is manufactured largely in the vicinity of Niagara Falls and is sometimes sold in fine powder under the name of Diamond Dust. Such experiments as I have made with this substance leads me to believe that it may become useful, especially for powder polishes.

Many other substances might be enumerated as certain forms of clay, wood and coal ashes, etc., but the above list includes all the more important materials entering into the composition of modern metal polishes. By a judicious combination of one or more of these abrasive agents with a suitable base, a polish adapted to any desired purpose may be obtained.

An almost infinite variety of polish bases have been and are still in use. Liquid polishes generally make use of kerosene, gasoline, alcohol or water as a vehicle for the powders, but the fact that none of these will permanently hold the polishing agent in suspension has led to the combining with them of various other substances designed to accomplish this purpose. For instance, oleic acid is often used

in connection with gasoline or kerosene, and sometimes this substance is used alone for the purpose. It possesses a rather disagreeable odor which must be disguised by the use of a suitable perfuming substance and when used alone is somewhat greasy and sticky. By combining oleic acid with kerosene or gasoline and then adding a portion of concentrated ammonia, a sort of a soap is produced which is of sufficient density to keep most polishing powders from precipitating. The amount of oleic acid and ammonia to be used are largely a matter of personal preference and a few experiments will give you a general idea of how these substances act in combination.

There are at present on the market a considerable number of semi-liquid polishes, consisting of soft soap combined with the desired polishing substance. Ordinary green soap may be used in these, adding sufficient water to bring the mixture to desired consistence, or the soap may be formed by the interaction of oleic acid and ammonia and diluted to give the desired degree of fluidity. The cleansing action of the soap and the ease with which greasy surfaces may be thoroughly cleaned by its use, makes this base valuable, aside from its property of holding the polishing powders in a permanent state of suspension

One of the obstacles met with in attempting to duplicate proprietary metal polishes is the fact that some of these contain as a polishing material some *local* abrasive agent, i. e., one which is found native in the vicinity of the manufactory or else in territory over which the manufacturers have control. This material is likely to differ considerably in appearance and action from any of the commercial polishing materials, and in cases of this kind it is self evident that the only way to exactly duplicate the polish would be to locate a source of supply for the particular materials used in its manufacture.

It may be stated, as a general rule, that such materials do not possess any great advantage over the commercial abrasives, except that they give a distinguishing tone to the product. For the most part they are clays, or some form of rock waste, although some of them approach very closely the composition of true infusorial earth, being a species of finely powdered marl.

This matter is worthy the attention of any manufacturer and it might be found profitable to conduct some experiments along the line of combining such local materials as may seem to possess properties which would recommend them as polishing agents, with different bases. It may be that a fortune is lying at your door, wanting only your touch to convert it into tangible form.

A considerable number of the following formulas are the results of laboratory experiments and several of them have been obtained from the analysis of highly advertised and deservedly popular proprietary preparations.

Powder Metal Polishes.

In making powder polishes, any one of the abrasive materials described may be used singly or any two or more of them in combination. In view of the fact that the nature of each material has been so fully described, it would seem unnecessary to give detailed formlas, as anyone by selecting the materials adapted to the purpose intended, can easily produce a polish which will give entire satisfaction. However, for the benefit of those who prefer not to experiment with the different materials, several combinations are suggested.

I.

Whiting	1 pound
Cream of Tartar	1 ounce

Venetian Red, enough to give a pink color

Mix well.

This makes a good polish for silverware and jewelry. In use it is applied with a dampened sponge or cloth and followed by a brisk rubbing with a soft cloth or chamois.

Whiting alone makes a fairly good polish for the purpose but the addition of cream of tartar improves the polishing action. In making this polish, a good grade of whiting should be used and it would be better if it could be bolted through cloth to remove any coarse particles of grit which may be present.

II.

Tripoli	1 pound
Prepared Chalk	2 pounds
Calcined Magnesia	4 ounces

Mix well and use as directed for No. 1.

This is suitable for the same purposes as the preceeding formula:

III.

Tripoli	1 pound
Whiting	1 pound
Finest Pumice	1 pound

Mix well.

Suitable for brass and tinware. Use as directed for the preceeding formulas.

IV.

Infusorial Earth	2 pounds
Tripoli	1 pound
Oxalic Acid	1½ ounces

Mix thoroughly, having first reduced the acid to a fine powder.

This is a quick acting polish for brass and copper. A sharper effect may be given to it by replacing a portion of the infusorial earth with silex. From six to eight ounces of the latter material will be sufficient.

V.

Infusorial Earth	1 pound
Tripoli	½ pound
Tartaric Acid	1 ounce
Kaolin	½ pound

Reduce the tartaric acid to a fine powder and mix all the ingredients thoroughly.

This is adapted to the same uses as the preceeding formula but is less active in chemical effect, owing to the use of a milder acid.

VI.

Prepared Chalk	1 pound
Best Whiting	1 pound
Bicarbonate of Soda	4 ounces

Mix well.

Suitable for the same purposes as Nos. 1, 2 and 3.

VII.

Fine Emery Powder	4 ounces
Finest Pumice	8 ounces
Whiting	1 pound
Powdered Dried Carbonate of Soda	4 ounces

Mix thoroughly.

This polish is suitable for polishing iron and steel, such as the bright iron work on stoves.

Liquid Metal Polishes.

The liquid polishes include a large number of varieties. The following formulas show typical bases and the abrasive agents may be varied to suit any particular purpose.

I.

Soft Soap	2	pounds
Water	10	pints
Borax	8	ounces

Ammonia Water	1½ ounces
Infusorial Earth	2 pounds
Tripoli	½ pound

Dissolve the soap in the water by means of heat, adding the borax. Remove from the fire and when cool, add the ammonia and stir in the powders mixing thoroughly.

The consistence of this polish may be varied by using a greater or smaller portion of soft soap. This soap is made from linseed oil, saponified with caustic potash, being the "green soap" of the druggist. The process of making is a comparatively simple one and as it is much cheaper to make than to buy it, the formula is here given.

Linseed Oil (raw)	40 ounces
Caustic Potash	9 ounces
Alcohol	4 ounces
Water	Sufficient

Heat the linseed oil on a water bath to about 140° Fahr. Dissolve the caustic potash in 45 fluid ounces of water and add the alcohol to the solution. Add this solution to the oil, gradually with constant stirring, continuing the heat for about half an hour or until a jelly like soap is formed.

The formula as given above, makes a neutral soap, suitable for medicinal purposes, but in practice, where the soap is to be used in the manufacture of polishes, etc., it is better to use a somewhat larger percentage of alkali, say 10 ounces, instead of the quantity directed above. The alcohol may be advantageously replaced with wood alcohol, where the soap is intended for technical purposes only.

By using more alkali, the soap becomes more readily soluble in water and its power of removing grease is greatly increased.

It will be found somewhat simpler to combine the soap making and polishing making processes, by adding the re-

quired amount of water to the soap as soon as saponification is complete, then cooling and mixing the other materials with it.

II.

White Laundry Soap	1 pound
Ammonia Water (16 deg.)	2 pints
Water	4 gallons
Potassium Carbonate	2 ounces
Whiting	3 pounds
Prepared Chalk	1 pound

Shave the soap small and dissolve in the water, together with the potassium carbonate, using sufficient heat to make the soap dissolve readily. Let cool, add the ammonia and lastly the polishing powders. Put up in cans or bottles.

In use, shake well, then apply with a soft cloth, polishing with dry cloth or chamois.

III.

Alcohol	1 pint
Ammonia Water (16 deg.)	1 pint
Prepared Chalk	½ pound

Mix the liquids and add the prepared chalk.

This makes an excellent polish for jewelry and fine silverware. In using, shake well, apply with a sponge or soft cloth and polish with dry cloth or chamois.

Wood alcohol may be used instead of grain alcohol in this product, in which case it is well to add some perfuming oil to disguise the odor. Oil of sassafras or cinnamon or a mixture of these make a good perfuming material.

IV.

Jeweler's Rouge	2 pounds
Kerosene	1½ pints
Nitro Benzol	1 ounce
Crude Oleic Acid	1 gallon

Mix the liquids and add the jeweler's rouge in fine powder.

This makes a good general purpose polish. Should the color produced by using the jeweler's rouge be objectionable, it may be replaced with tripoli, infusorial earth or a mixture of these.

Jeweler's rouge is generally carried in stock by all druggists but may be prepared extemporaneously by saturating a solution of sulphate of iron with a solution of oxalic acid, that is, add the acid as long as a precipitate is formed. Filter or decant the liquid and expose the precipitate to heat until it assumes a deep red color.

V.

Infusorial Earth	2 pounds
Powdered Carbonate of Soda	4 ounces
Powdered Soap	8 ounces
Hot Water sufficient to make a liquid of the desired consistence.	

Dissolve the soap and carbonate in the smallest possible quantity of water, by means of heat, then add the powdered earth gradually, and enough more water to make a creamy liquid.

This is an excellent polish for silverware, jewelry and similar articles.

The same base may be used with almost any combination of abrasive substances, making polishes adapted to practically any purpose.

VI.

Tripoli	1 pound
Whiting	1 pound
Prepared Chalk	1 pound
Stearin	1 pound
Gasoline	1 gallon
Oleic Acid	8 ounces

Dissolve the stearin in the gasoline, add the oleic acid and then stir in the powders, using care to keep them from

forming in lumps. More or less stearin may be used to give any desired body, and the gasoline may be replaced in whole or in part with kerosene.

The explosibility of gasoline should be kept in mind in making and handling polishes containing this substance as an ingredient. The work should be done either out of doors or in a room away from fire and lights and the label should instruct the purchaser not to attempt to use it near a fire.

The addition of a small quantity of ammonia to the above mixture will form a sort of a soap and produce a polish of heavier consistence. Use from four to eight ounces of ordinary ammonia water to the above quantity.

VII.

Powdered Rotten Stone	1 pound
Lubricating Oil	1 pint
Kerosene	3 pints

Mix.

This makes a polish suitable for coarse tinware, brass, copper, etc. It is considerably used for polishing the bright parts of engines and smaller machinery.

VIII.

Infusorial Earth	10	ounces
Red Bole	4	ounces
Wood Ashes, sifted	6	ounces
Prepared Chalk	30	ounces
Stronger Ammonia	10	ounces
Wood Alcohol	20	ounces
Amyl Acetate	1	ounce
Water	1½	gallons

Mix the alcohol and amyl acetate, add the water gradually with constant stirring and then stir in the powders, keeping free from lumps.

Suitable for the same purpose as No. 7, and may be used as a general purpose polish in the kitchen.

Oleic Acid	12 ounces
Stronger Ammonia	6 ounces
Water enough to make a liquid of the desired consistence.	

Add to this mixture any perfuming material desired, as nitro benzol, citronella, etc., and then stir in sufficient tripoli, infusorial earth and prepared chalk to give the mixture good polishing qualities. It may be made thicker if desired by using more of the oleic acid and ammonia, which in combination form a sort of a soap.

This makes a good base for a large number of polishes. Combined with jeweler's rouge it gives a fine polish for silverware and jewelry.

Paste Metal Polishes.

Paste polishes differ from the liquid forms only in the base used, and, indeed, the distinction between the two is rather a difference of consistence than of materials. Soap, which forms the base of many of the liquid polishes, is extensively used in the manufacture of pastes, and petroleum products are also largely employed in the paste polishes, paraffin and petrolatum taking the place of the lighter hydrocarbon oils used in the liquid forms of this product.

Roughly speaking, paste polishes may be divided into two general classes, i. e.,those made with a soap base and those consisting of various abrasive agents combined with petrolatum and paraffin in varying proportions. Occasionally one meets with polishes in which some other material as gelatin has been employed as a base, but on account of the tendency of such materials to harden into a solid mass, such polishes have never attained much popularity.

In making pastes with soap it is only necessary to dissolve ordinary laundry soap in the smallest possible quantity of water by means of gentle heat and then combine it with

the desired abrasive materials. Sometimes a little glycerin is added to prevent too rapid drying and oleic acid is sometimes employed for the same purpose. Where these polishes are produced on a large scale, the soap is sometimes produced in a pasty form instead of making use of the commercial hard soaps. For information concerning soap making, see the instructions in that subject.

The following formulas are merely suggestive. While any one of them will give a good marketable product, it is intended that the manufacturer shall use his own judgment in the matter of proportions of the different ingredients and a little attention given to this subject will enable almost anyone to obtain a distinctive product, possessing as much merit as any of the highly advertised polishes.

I.

Yellow Soap	1 pound
Precipitated Chalk	2 ounces
Jeweler's Rouge	1 ounce
Tripoli	1 ounce
Water	Sufficient

Cut the soap in thin shavings and dissolve in the smallest possible quantity of water by means of gentle heat, then work the powders into it so as to form a smooth paste. The addition of about one ounce of glycerin will prevent too rapid drying of the product.

This polish may be modified by using other abrasive materials so as to give a polish for any particular purpose. As given above the formula produces a good general purpose polish which may be safely used on silverware, etc.

Some other combinations of abrasives are given below.

Infusorial earth and tripoli, equal parts. Combine with the base as directed above. This polish is similar in action to that produced by formula No. 1.

Powdered Rotten Stone	1 part

Powdered Pumice (finest)	1 part
Tripoli	2 parts

Combine with the base as above directed to make a good polish for tinware, etc.

Infusorial Earth	2 parts
Jeweler's Rouge	1 part

Combine with the base as above directed to make a polish suitable for general household use.

Silex	1 part
Tripoli	2 parts
Infusorial Earth	4 parts

Combine with the soap base as directed; this makes a good polish for brass, copper, nickel, etc.

II.

Tripoli	5 pounds
Paraffin Wax	1 pound
Lubricating Oil (heavy)	½ gallon
Kerosene	1 quart

Melt the wax with the lubricating oil, remove from the fire and add the kerosene. While cooling stir in the tripoli, working to a smooth paste.

This polish is excellent for brass and copper and by varying the polishing materials used may be adapted to any desired purpose.

The use of more or less wax will make a heavier or a lighter paste. It may be scented by using a little nitro benzol or oil of citronella.

III.

Jeweler's Rouge	1 pound
Powdered Rotten Stone	1 pound
Infusorial Earth	1 pound
Oxalic Acid	1 ounce

Petrolatum sufficient to make a paste of any desired consistence. Nitro benzol or other perfuming oil sufficient to give a pleasant odor.

Reduce the oxalic acid to a fine powder and mix thoroughly with the other powders. Melt the petrolatum and while cooling work in the powders.

This is excellent for brass and copper, working rapidly and producing a finely polished surface. Apply with a soft cloth, polishing with a dry cloth or chamois.

By using sufficient palm oil to reduce the mixture to the consistence of syrup or thick cream, an excellent semi-liquid polish is produced.

IV.

Petrolatum	1 pound
Paraffin Wax	8 ounces
Paraffin Oil	1 pint

Melt the paraffin and mix with the petrolatum, then add the paraffin oil; remove from the fire and while cooling work into the mass about three pounds of tripoli or any desired combination of polishing powders.

The above formulas will, I trust, prove sufficient to meet all requirements in the way of a paste polish. By varying the proportions of the basic materials and the kinds of abrasive powders, an almost infinite variety of polishes may be secured.

POLISHING SOAPS OR BLOCKS.

Everyone is familiar with Sapolio and Bon-Ami, and while I do not profess to know the exact method of preparing these particular brands, I feel certain that the formulas below will enable anyone to produce a satisfactory article.

I.

Cocoanut Oil	7 pounds
Tallow	3 pounds
Solution of Soda (23° Baume)	Sufficient
Tripoli	2 pounds
Powdered Alum	1 pound
Whiting	1 pound

Melt the tallow and add the cocoanut oil. Then add sufficient of the soda solution to saponify the fats when boiled with them for an hour or so. It is best to add the soda solution in small quantities, continuing the boiling with constant stirring until a jelly like soap is produced. Then continue the heat until the soap forms a firm paste; stir in the powders and pour the mixture into molds to harden.

Several manufacturers of soap machinery furnish special stamping presses for shaping the cakes of polishing soap. See addresses in appendix.

A simpler method of making a polishing soap is as follows:

II.

Dissolve commercial hard soap in the smallest possible quantity of water and work into it enough of the desired polishing powders to form a stiff paste. Press into molds or form into cakes of the desired size and shape, by hand. This may be colored if desired by the addition of a suitable aniline color.

III.

The following formula for silver soap is highly recommended:

White Hard Soap	10 ounces
Water	12 ounces
Prepared Chalk	2 pounds

Cut the soap small and dissolve in the water by means of heat. Then work the powdered chalk into the mass, mixing to an even paste; press in molds of the desired size and shape.

One occasionally comes across a canvassing agent selling a silver polish in the shape of small balls of some white material. These are simply common whiting mixed up with ammonia to a stiff paste. The mass is rolled into balls with the hands and these balls are then dried in the oven. By using a little soap solution a firmer cake may be made.

Polishing Cloths.

These are made from double faced canton flannel, impregnated with some polishing material. The following formula will be found entirely satisfactory:

Oleic Acid	4 ounces
Ammonia	4 ounces
Water	1 gallon

Mix the oleic acid and ammonia and then add the water (warm) and stir until well mixed.

The cloths used are the heavy double faced cotton flannel; this makes a cloth which will wear well and do good work. Cut the cloths about 9 inches square.

The powder used in filling the cloths depends upon the work to be done with them. It is customary to make two grades, using a dark flannel for the coarse for cleaning brass, copper, etc., and white for the finer grade for use on silverware.

Soak the cloths in hot water and wring out as dry as possible. Dip in the solution and work with the hands until the cloth is thoroughly impregnated. Keep the solution hot while dipping the cloths. Then run them through a wringer and while still hot, spread out on a smooth surface and sprinkle well with the powders, using fine emery powder for the dark cloth and fine tripoli for the white cloth. Rub the powder well into the cloth and then turn over and repeat on the other side; hang up and dry and when dry brush out the loose powder from both sides with a medium soft brush, saving the powder for future use. The cloths may be ironed smooth if necessary.

They are usually put up in envelopes with directions printed on them. In using, always polish with the cloths dry. Wetting spoils them.

FURNITURE POLISHES.

The older forms of this specialty consisting principally of linseed oil, turpentine and beeswax, and depending

upon the liberal application of "elbow grease" to bring out their effect are now but little used except upon natural or "rubbed" finished articles, it having been proven by experience that the more modern products, consisting largely of gums, resin, etc., dissolved in alcohol and combined with various oils, are more satisfactory for varnished surfaces. The action of these polishes depend upon two essential features, i. e., the presence of a solvent like alcohol, which softens up the old varnish, thus giving it a new surface and removing spots and scratches and sufficient gum, resin, etc., to give a light coating over the original finish. In truth, these polishes are really varnishes in more or less dilute form.

Another variety of this specialty which enjoys considerable popularity is an emulsion of gums, oils, etc., with ordinary soap. In some of these, the soap in solution, is mixed with the oils, etc., while in others no soap is used, but in its place some alkali like soda or potash, which unites with the oils of the polish forming a soap, during the process of manufacture.

Shellac varnish, i. e., shellac dissolved in alcohol, combined with sufficient oil to give it the proper rubbing qualities makes a fairly good furniture polish and several of the proprietary articles in this line now on the market are composed of these materials. Used alone, the shellac solution dries too rapidly to allow of spreading smoothly and the alcohol softens up the original varnish to too great a degree: but combined with the proper proportion of oil, these defects are overcome and a good working polish is produced.

A type of the old style "rubbing polishes" is represented by the following formula:

I.

Linseed Oil (boiled)	1 pint
Turpentine	1 pint

Pure Cider Vinegar	1 pint

Mix by shaking together.

This polish separates into two layers in the bottle, the oil and turpentine floating on the vinegar. In using the bottle is well shaken and the polish is applied with a piece of soft canton flannel, and rubbed briskly until a good polish results.

Another formula which is very popular and has often been sold under the name of French Polish Reviver, is made as follows:

II.

Linseed Oil	1 pint
Gum Camphor	2 ounces
Cider Vinegar	4 ounces
Spirits of Ammonia	½ ounce
Butter of Antimony	1 ounce

Cut the camphor in small pieces and dissolve in the oil by heating on a water bath; add the vinegar in small proportions, shaking well after each addition; then add the other materials in the same manner. This polish must be mixed exactly according to these directions to give anything like satisfaction.

In use it is applied with a soft cloth, rubbing with a circular motion, and then polished with a clean, dry piece of flannel.

The so-called "butter of antimony" is a corrosive liquid and care should be taken in handling it not to spill the liquid on the hands or clothing. Chemically speaking, it is antimony chloride.

A similar product may be made by formula No. 3.

III.

Alcohol	1½ ounces
Hydrochloric Acid	½ ounce
Linseed Oil	8 ounces

Best Cider Vinegar	1 pint
Butter of Antimony	1½ ounces

Add the other ingredients to the oil in small quantities at a time with constant shaking. The vinegar should be added last.

Use as directed for No. 2.

A more up-to-date polish may be produced by using the following formulas:

IV.

Paraffin Oil	1 gallon
Wood Alcohol	½ gallon
Water	½ gallon
Gum Benzoin	2 ounces
Amyl Acetate	½ ounce
Oil of Cedar	1 dram

Dissolve the gum in the alcohol, add the amyl acetate and oil of cedar and mix this solution with the paraffin oil; lastly add the water stirring well.

This polish separates into two portions with a white powdery precipitate in the bottom of the bottle. In use, the bottle is well shaken and a piece of soft cheese cloth moistened (not saturated) with the liquid. They apply to the surface to be polished, rubbing briskly with the grain of the wood until the polish is dry.

Nitro benzol may be used instead of the amyl acetate if preferred, the principal object of using these substances being for the odor they impart to the product.

Either white paraffin oil or some of the darker varieties may be used in the above formula. If it is desired to color the polish, mix a little oil soluble red aniline with the oil and a small quantity of oil soluble red aniline with the water.

V.

Balsam of Fir	1 pound
Sulphuric Ether	1 pint
Turpentine	½ pint

Furniture Varnish	½ pint
Linseed Oil	1 gallon

Mix the balsam of fir with the ether, add the varnish and turpentine which have been previously mixed and then slowly stir the oil into this mixture.

VI.

Cup Grease	8 pounds
Benzine	2 gallons
Wood Alcohol	1 quart
Ammonia Water (16 deg.)	6 ounces
Water	1½ gallons
Turpentine	1½ pints

Mix the cup grease with the turpentine and stir this into the benzine; add the ammonia and alcohol and lastly stir the water into the mixture. After all the water has been added stir briskly until a smooth mixture is obtained.

Apply with a piece of soft cheese cloth, rubbing till dry.

Furniture polishes in paste form are in quite general demand and numerous formulas for such mixtures have been offered from time to time. Most of these depend on beeswax for the polishing agent and consist of an emulsion of this wax with soap, etc. The following formulas have been tested and found reliable:

VII.

Beeswax	2 pounds
Turpentine	40 ounces
Castile Soap	1 ounce
Caustic Soda	2 drams
Water	40 ounces

Melt the beeswax on a water bath and add the turpentine, stirring well until mixed. Dissolve the soap and caustic soda in the water by means of heat and add this (boiling hot) to the wax and turpentine. Remove from the fire and stir until it sets, then put up in boxes.

The paste may be made as firm as may be desired by using more wax. A red color may be imparted to the mixture by macerating an ounce of crushed alkanet root in the turpentine until the color is extracted and then straining.

In use this polish is applied with a soft cloth with plenty of rubbing and then polished with a dry soft cloth.

VIII.

A prominent German technical journal gives the following formula which I have found to produce an excellent polish.

Beeswax	80 ounces
Resin	20 ounces
Venice Turpentine	12 ounces
Turpentine	60 ounces

Melt the beeswax, resin and venice turpentine together by gentle heat, remove from the fire and stir in the turpentine which has been slightly warmed to prevent too rapid solidification.

In use, the furniture is first washed with warm soap suds and the mixture applied with a soft cloth, polishing with a clean dry flannel.

IX.

Another formula, also from the a German technical journal, is as follows:

Yellow Wax (Beeswax)	100 parts
Paraffin Wax	60 parts
Ceresin	40 parts
Turpentine	460 parts

Melt the waxes together and stir in the turpentine.

Use as directed for No. 8.

STOVE POLISHES.

All stove polishes, no matter what their exact composition, depend upon one material for their effect. Nothing has ever been found which would replace graphite to advan-

tage in polishes of this kind and practically every known stove polish consists of this substance combined with various other materials designed to facilitate its application, hold it in closer contact with the metal or impart a deeper color to the polish.

It should be remembered that there are an extremely large number of different grades of graphite and that much of the quality of any stove polish will depend upon the kind of graphite used in its production. Some grades of the material give a brilliant metallic lustre, while others impart to the metal a dull, leady color. It is impossible to get a good polish from a cheap grade of graphite.

Graphite, also known as plumbago and black lead, is one of the so-called "allotropic" forms of carbon. It occurs naturally in many localities, being extensively mined in England, Ceylon, Siberia, California and in the Adirondack region of New York, as well as in some other parts of the world. It has also been produced artificially from coal by means of the electric furnace. In powder, this material has a peculiar greasy feel, reminding one of powdered soapstone and it is employed to some extent as a lubricant, entering into the composition of several well known brands of axle grease. It also finds employment in the manufacture of lead pencils and crucibles and is sometimes used for glazing the grains of gunpowder. Gas black or gas carbon, which forms in the retorts during the manufacture of illuminating gas from coal, is very similar to graphite and is sometimes mixed with it to give a deeper color to polishes, etc.

As graphite is practically unaffected by any ordinary temperature to which it may be subjected, it is eminently adapted for use in polishes to be used on metal which is frequently heated. When the polish "burns off" the stove, it is not on account of the graphite being consumed but because the "binding material" used with it has burned away and there is nothing to hold the graphite to the iron.

I might multiply formulas for stove polishes to an almost unlimited extent but to do so would only prove confusing and occupy space which might be more profitably used for some other purpose. I shall therefore limit myself to one or two formulas for each of the more common forms of this useful commodity.

The liquid polishes, now sold are composed for the most part of water with which is mixed graphite and various other materials designed to act as a binder between this substance and the metal to which it is applied. As a binding material sugar, glue, alum, copperas, gum tragacanth and dozens of other materials have been employed. Probably one of the most useful is gum tragacanth which, although it does not resist heat to a much greater extent than sugar,etc., is free from the objection of smoking when applied to the hot metal. Copperas, it is claimed, possesses the power of entering into chemical combination with the metallic iron and it is useful in most types of stove polishes. Alum acts principally as a binder but is also credited with increasing the lustre of the polish.

The following formula produces a typical liquid polish:

I.

Gum Tragacanth	4 ounces
Water	4½ pints
Powdered Alum	3 ounces
Sugar	1 ounce
Turpentine	6 ounces
Dixon's Best Graphite	4½ pounds

Put the tragacanth in the water and let it stand until it is thoroughly softened. This will require about twenty-four hours. Then dissolve the alum in the mixture, add the turpentine and stir well. Then stir in the graphite and lastly add water to reduce to the desired consistence.

The use of strong black coffee in the place of water is

sometimes recommended but the only value of this is that it supplies a larger quantity of organic matter, which of course gives a blacker appearance to the polish after it has been heated sufficiently to char the organic substances contained.

It is advisable to add something in the nature of a preservative in order to prevent the liquid from fermenting. A small quantity of salicylic acid or benzoate of soda will be found satisfactory for the purpose.

Several liquid polishes on the market consist of a mixture of gasoline and paraffin oil in the proportions of about eight parts of the former to one of the latter, with which is mixed sufficient graphite to give the desired polishing effect. Such polishes give a very quick lustre but are extremely dangerous to use on account of the inflamability of the gasoline and oil. Recently one of the leading drug journals reported an action for damages which was brought against a manufacturer of a polish of this nature which took fire in using and severely burned the user.

II.

Saturated Solution Tannic Acid	3 parts
Saturated Solution Sulphate of Iron	2 parts
Glycerin	1 part
Gas Black (Carbon Black)	1 part
Best Graphite	5 parts

Mix well, and add enough water to reduce to the desired consistence.

Paste stove polishes are, for the most part, compounds of graphite with soap, oils, etc., to form a mass of the consistence of a heavy ointment. They are very popular and being cheap and easy to produce pay a good profit to the manufacturer.

The following formulas are typical:

I.

Hard Yellow Soap	1 pound

Turpentine	1 pint
Resin	½ ounce

Graphite enough to give a paste of the desired consistence.

Shave the soap small and dissolve in the smallest possible quantity of water by means of heat; reduce the resin to powder and dissolve in the turpentine; then combine this mixture with the soap solution. Then stir in the graphite, working to a smooth paste and put up in boxes. If a blacker compound is desired a little lampblack or carbon black may be added.

II.

Make a paste by combining a good quality of graphite with paraffin oil, grinding thoroughly together. A small quantity of powdered resin may be added if desired. In using resin in polishes the tendency of this substance to smoke when heated should be kept in mind and care taken not to use enough of it to give a disagreeable odor when the polish is heated.

In the way of powder polishes, there is not much opportunity to produce anything new. Many of the powders sold consist solely of graphite, but it is better to combine this material with a suitable binding agent. The following formula makes a good powder polish:

Best Graphite	1 pound
Sugar	1 ounce
Powdered Resin	½ ounce

Mix well.

In using, mix with a little water and apply with a dauber or cloth. Polish with a dry cloth or polishing mitt.

The polishes sold in cake form are usually composed of graphite mixed with clay and pressed into shape. By mixing graphite with dextrin mucilage to form a stiff paste and then forming in cakes a good polish will be produced.

Another form of stick polish, designed to be used by

rubbing the stick over the stove while warm and then polishing with a cloth or polishing mitt, consists of graphite mixed with paraffin wax in the proportion of about six ounces of the wax to a pound of graphite. The paraffin is melted and the graphite stirred into it while cooling and the mass moulded into sticks of the required size. This polish is somewhat objectionable on acount of the smoke produced when the wax is heated.

The black enamel sold for the purpose of coating such parts of stoves as are not subjected to heat enough to cause it to burn off, consists of ordinary asphaltum varnish thinned out with turpentine. A suitable product may be made by dissolving one pound of asphaltum in a pint of linseed oil by means of heat and then adding two pints of turpentine. Apply with a flat brush.

HOUSEHOLD AMMONIA.

Ammonia in its natural form is a gas. In the commercial product this gas has been absorbed by water forming what is known as aqua ammonia or water of ammonia. Cold water will absorb a large proportion of this gas and the resulting product apears in commerce in various strengths, the 16° or ordinary aqua ammonia and the 26° called stronger ammonia.

The ordinary Household Ammonia is simply aqua ammonia reduced in strength. In order to add to its cleansing power some other substance is generally used with it such as carbonate of potassium. This also increases the specific gravity so that a weak amomnia water holding a portion of carbonate of potassium in solution will show as high a hydrometer test as the stronger forms of the liquid without the addition of this substance.

Clear Household Ammonia is made as follows:

Potassium Carbonate	1 ounce
Rain Water	4 pints

Ammonia Water (16 deg.)	4 pints

Dissolve the carbonate in the water and add the ammonia water.

The cloudy variety is generally made from the following formula:

Any Good White Soap	2 to 4 ounces
Rain Water	4 pints
Ammonia Water	4 pints

Shave the soap, dissolve in the water by means of heat and when cool add the ammonia water. Stir well.

From the above it will be seen that Household Ammonia is simply a diluted form of the commercial article with certain additions designed to increase its cleansing action or change its appearance.

In practice it is advisable to use the stronger ammonia and dilute it sufficiently to give the desired strength; then in case the carbonate or soap is desired to use it as directed above.

In some states there is a law regarding the strength of ammonia, it being illegal to sell that which falls below the specified strength. In formation regarding the regulations in your state, if such exist, may be had free of charge by writing the Secretary of State at the State Capital.

To duplicate any particular sample so far as strength is concerned, it is only necessary to take a small quantity of the sample, say one-half ounce, and add to it a drop or two of a solution of phenolpthalein. This will immediately turn the ammonia a bright red color. Now drop into it sulphuric acid, counting the number of drops added. Continue to add the acid, stirring with a glass rod until the color entirely disappears. This indicates that the alkali is entirely neutralized. Then dilute your product until it requires the same quantity of acid to destroy the color in a half ounce sample, that it did of the product you first tested.

FLAVORING EXTRACTS.

Flavoring extracts may be divided into two general classes, viz., pure and synthetic, or as it is more generally called, artificial. Strictly speaking there is a difference between a synthetic and an artificial extract, the former being made up of materials which exactly duplicate the chemical composition of the true flavoring material, while the latter are compounds of various substances intended to represent more or less closely the flavor of the substance being imitated without regard to similarity of chemical structure. However, these two terms are used interchangeably by most people and the present pure food laws in force in most states, as well as the national law, demand that extracts made from materials, synthetically produced, shall be labelled "artificial" or "imitation" flavors.

By a pure extract is meant one made directly from the bark, root, fruit or seed or an essential oil of the same, in alcoholic solution. Artificial extracts are various combinations of synthetic materials or of these in connection with ethers or other chemicals designed to impart the distinctive taste and odor of the material in question.

From the fact that certain fruits, as strawberries, raspberries, bananas, pineapples, etc., yield no essential oil containing the flavoring principle, or in case they do, in such small quantities as to make its production on a commercial scale impracticable, it naturally follows that the only practical way of making extracts giving these flavors, is by making use of such substances as ethers, etc., which when properly blended will imitate the true odor of the fruit to a marked degree. The odor or "boquet" of fruits is due to minute portions of these ethers which develop naturally in the fruit itself during the ripening process. Therefore, the ethers used in duplicating these odors, may be considered as "synthetics" since they are artificial products,

corresponding in chemical structure with those existing in nature.

Various processes are extant for producing flavoring extracts directly from such fruits as those mentioned in the preceeding paragraph, such as macerating the fruit in dilute alcohol for a considerable time and then filtering or extracting the fruit with a volatile solvent in a similar manner to that employed in the production of concrete perfumes, afterward evaporating the excess of the solvent by distilling in a vacuum. The first method does not produce an extract which is satisfactory either from the standpoint of strength or keeping qualities, and it is easily apparent that the second method is not adapted to the needs of the average manufacturer. Very few of these extracts are on the market, the flavors sold for culinary purposes being practically all artificial. For such purposes as flavoring soda water and ice cream, the pure fruit pulp or juice is largely employed, but for confectionery and food products generally, outside the ones just mentioned, the artificial extracts are used almost exclusively.

The quality of an artificial extract will depend upon the skill of the person blending the materials used in its production and the quality of the materials themselves. Many of the larger firms engaged in the sale of essential oils and similar products market what are known as Artificial Fruit Oils, these being blends of various ethers and other materials in the proportions which experience has shown to be most satisfactory. The use of such materials will enable the manufacturer of little or no experience, to make artificial extracts which will compare favorably with those of the firms of many years experience, as he has the advantage of the skill of the expert employed by the supply house in the production of the so-called oils used. Generally speaking, first attempts at blending the raw materials used in the production of artificial fruit flavors are not very successful and

it is doubtless wiser for the beginner in this work to buy his "fruit oils" from the large dealers instead of attempting to produce them himself.

The formulas given in this volume for the production of artificial oils have proven extremely satisfactory in use, and by using care in making them up in exact accordance with the formulas, superior products will be assured. The amateur in this work should always experiment with small quantities of the materials until he is familiar with the strength and nature of each of them, before attempting the production of these flavors on a large scale.

Before going into detail in regard to the manufacture of extracts, it has been deemed advisable to reprint a portion of one of the bulletins issued by the United States Department of Agriculture, defining the various extracts and specifying the legal requirements for each under the Food and Drugs Act of June 30, 1906.

1. A flavoring extract is a solution in ethyl alcohol of proper strength of the sapid and odorous principles derived from an aromatic plant, or parts of the plant, with or without its coloring matter, and conforms in name to the plant used in its preparation.

2. Almond extract is the flavoring extract prepared from oil of bitter almonds, free from hydrocyanic acid, and contains not less than one (1) per cent. by volume of oil of bitter almonds.

2a. Oil of bitter almonds, commercial, is the volatile oil obtained from the seed of the bitter almond (Amydalus communis L.), the apricot (Prunus armenioca L.), or the peach (Amygdalus persica L.)

3. Anise extract is the flavoring extract prepared from oil of anise, and contains not less than three (3) per cent. by volume of oil of anise.

3a. Oil of anise is the volatile oil obtained from the anise seed.

4. Celery seed extract is the flavoring extract prepared from celery seed or the oil of celery seed, or both, and contains not less than three tenths (0.3) per cent. by volume of oil of celery seed.

4a. Oil of celery seed is the volatile oil obtained from celery seed.

5. Cassia extract is the flavoring extract prepared from oil of cassia and contains not less than two (2) per cent. by volume of oil of cassia.

5a. Oil of cassia is the lead-free volatile oil obtained from the leaves or bark of Cinnamomum cassia Bl., and contains not less than seventy-five (75) per cent. by weight of cinnamic aldehyde.

6. Cinnamon extract is the flavoring extract prepared from oil of cinnamon and contains not less than two (2) per cent. by volume of oil of cinnamon.

6a. Oil of cinnamon is the lead-free volatile oil obtained from the bark of the Ceylon cinnamon (cinnamomum zeylanicum, Breyne), and contains not less than sixty-five (65) per cent. by weight of cinnamic aldehyde and not more than ten (10) per cent. by weight of eugenol.

7. Clove extract is the flavoring extract prepared from oil of cloves, and contains not less than two (2) per cent. by volume of oil of cloves.

7a. Oil of cloves is the lead-free, volatile oil obtained from cloves.

8. Ginger extract is the flavoring extract prepared from ginger and contains in each one hundred (100) cubic centimeters, the alcohol-soluble matters from not less than twenty (20) grams of ginger.

9. Lemon extract is the flavoring extract prepared from oil of lemon, or from lemon peel, or both, and contains not less than five (5) per cent. by volume of oil of lemon.

9a. Oil of lemon is the volatile oil obtained, by expression or alcoholic solution, from the fresh peel of the lemon

(citrus limonum L.), has an optional rotation (25° C.) of not less than 60° in a 100-millimeter tube, and contains not less than four (4) per cent. by weight of citral.

10. Terpeneless extract of lemon is the flavoring extract prepared by shaking oil of lemon with dilute alcohol, or by dissolving the terpeneless oil of lemon in dilute alcohol, and contains not less than two tenths (0.2) per cent. by weight of citral derived from oil of lemon.

10a. Terpeneless oil of lemon is oil of lemon from which all of the terpenes have been removed.

11. Nutmeg extract is the flavoring extract prepared from oil of nutmeg, and contains not less than two (2) per cent. by volume of oil of nutmeg.

11a. Oil of nutmeg is the volatile oil obtained from nutmegs.

12. Orange extract is the flavoring extract prepared from oil of orange, or from orange peel, or from both, and contains not less than five (5) per cent. by volume of oil of orange.

12a. Oil of orange is the volatile oil obtained by expression or alcoholic solution, from the fresh peel of the orange (Citrus aurantium L.), and has an optical rotation of (25° C.) of not less than + 95° in a 100-millimeter tube.

13. Terpeneless extract of orange is the flavoring extract prepared by shaking oil of orange with dilute alcohol, or by dissolving terpeneless oil of orange in dilute alcohol, and corresponds in flavoring strength to orange extract.

13a. Terpeneless oil of orange is oil of orange from which all or nearly all of the terpenes have been removed.

14. Peppermint extract is the flavoring extract prepared from oil of peppermint or from peppermint, or both, and contains not less than three (3) per cent. by volume of oil of peppermint.

14a. Peppermint is the leaves and flowering tops of Mentha piperita L.

14b. Oil of peppermint is the volatile oil obtained from peppermint and contains not less than fifty (50) per cent. by weight of menthol.

15. Rose extract is the flavoring extract prepared from otto of roses, with or without red rose petals, and contains not less than four-tenths (0.4) per cent by volume of otto of roses.

15a. Otto of roses is the volatile oil obtained from the petals of Rosa damascena Mill., R. centifolia L., or R. moschata Herrm.

16. Savory extract is the flavoring extract prepared from oil of sacory or savory, or both, and contains not less than thirty-five hundredths (0.35) per cent. by volume of oil of sacory.

16a. Oil of savory is the volatile oil obtained from savory.

17. Spearmint extract is the flavoring extract prepared from oil of spearmint or from spearmint, or both, and contains not less than three (3) percent. by volume of oil of spearmint.

17a. Spearmint is the leaves and flowering tops of Mentha spicata L.

17b. Oil of spearmint is the volatile oil obtained from spearmint.

18. Star anise extract is the flavoring extract prepared from oil of star anise and contains not less than three (3) per cent. by volume of oil of star anise.

18a. Oil of star anise is the volatile oil distilled from the fruit of the star anise (Illicium verum Hook.)

19. Sweet basil extract is the flavoring extract prepared from oil of sweet basil, or from sweet basil, or from both, and contains not less than one-tenth (0.1) per cent. by volume of oil of sweet basil.

19a. Sweet basil, basil, is the leaves and tops of Ocymum basilicum L.

19b. Oil of sweet basil is the volatile oil obtained from basil.

20. Sweet marjoram extract, marjoram extract, is the flavoring extract prepared from the oil of marjoram, or from marjoram, or both, and contains not less than one (1) per cent. by volume of oil of marjoram.

20a. Oil of marjoram is the volatile oil obtained from marjoram.

21. Thyme extract is the flavoring extract prepared from oil of thyme, or from thyme, or both, and contains not less than two-tenths (0.2) per cent. by volume of oil of thyme.

21a. Oil of thyme is the volatile oil obtained from thyme.

22. Tonka extract is the flavoring extract prepared from tonka bean, with or without sugar or glycerin, and contains not less than one-tenth (0.1) per cent. by weight of coumarin extracted from the tonka bean, together with a corresponding proportion of the other soluble matters thereof.

22a. Tonka bean is the seed of Coumarouna odorata Aublet (Dipteryx odorata (Aubl.) Willd.)

23. Vanilla extract is the flavoring extract prepared from vanilla bean, with or without sugar or glycerin, and contains in one hundred (100) cubic centimeters the soluble matters from not less than ten (10) grams of vanilla bean.

23a. Vanilla bean is the dried, cured fruit of Vanilla planifolia Andrews.

24. Wintergreen extract is the flavoring extract prepared from oil of wintergreen and contains not less than three (3) per cent. by volume of oil of wintergreen.

24a. Oil of wintergreen is the volatile oil distilled from the leaves of the Gaultheria procumbens L.

According to the foregoing regulations, the minimum quantity of essential oil permissible in the various flavoring extracts is as follows, the specified amount being the smallest quantity which can be used in a gallon of extract conforming with the law.

Almond	1.28	fluid	ounces,	practically	10¼ drams
Anise	3.84	"	"	"	3⅞ ounces
Celery	.384	"	"	"	3¾ drams
Cassia (cinnamon)	2.56	"	"	"	2⅗ ounces
Cloves	2.56	"	"	"	2⅗ ounces
Lemon	6.40	"	"	"	6½ ounces
Lemon (terpeneless)	.256	"	"	"	2¼ drams
Nutmeg	2.56	"	"	"	2⅗ ounces
Orange	6.40	"	"	"	6½ ounces
Peppermint	3.84	"	"	"	3⅞ ounces
Rose	.256	"	"	"	2¼ drams
Spearmint	3.84	"	"	"	3⅞ ounces
Thyme	.256	"	"	"	2¼ drams
Wintergreen	3.84	"	"	"	3⅞ ounces

These quantities have not been worked out exactly, in each case, the quantity given at the right of the table being slightly in excess of the actual minimum quantity specified.

It must not be understood that the quantities given in the above table will produce the strongest grades of extract. They are simply stated as a minimum, below which no product can be legally sold. The exact quantity of the various essential oils to be used is largely a matter for the manufacturer to determine for himself, being guided by such conditions as the selling price of the finished product, the competition he must meet, etc.

The old rule of an ounce of oil to a pint of alcohol, is seldom followed at present, as in these days of sharp competition the manufacturer is compelled to produce his extracts at

a cost which will enable him to compete with other manufacturers in his territory in the matter of selling price. It will be found more profitable, in the long run, to make a good quality of extract and demand a fair price for it than to offer an inferior quality at a reduced price. Bargain prices may serve to gain a customer, but unless the goods are of a quality which will admit of repeated sales to the same parties, there is little opportunity of building up a permanent business with them.

In the case of extracts of lemon and orange which, next to vanilla, are probably the best sellers, the use of six and one-half to seven ounces to the gallon will give a good quality of extract and one which will meet all reasonable competition. With the other flavors, quantities of the oils ranging between the minimum specified and twice that quantity will be found most satisfactory in practice.

In regard to the alcoholic strength of extracts, it should be stated that no greater quantity of alcohol should be used than will suffice to hold the oil in permanent solution. Naturally the more oil used the greater will be the quantity of alcohol required, and as alcohol is one of the principal items of cost in the manufacture of an extract, it is easy to see that reducing the quantity of oil makes a saving, not only of its own cost, but in the reduced quantity of alcohol which may be employed as well. As a general rule, in the manufacture of extracts from essential oils, the alcoholic strength required ranges from 27 per cent. for a 1 per cent. extract of bitter almond to 90 per cent. for a five per cent. extract of orange. Lemon, for a five per cent. extract will require about 85 per cent. alcohol, cinnamon for a two per cent. extract 65 per cent., cloves for a two per cent. extract 62 to 65 per cent. nutmeg for a two per cent. extract 76 per cent, peppermint for a three per cent. extract 80 per cent. and wintergreen for a three per cent. extract

about 57 per cent. These figures are based on an article by Julius Hortvert, Chief Chemist Minnesota Dairy and Food Department, published in the American Perfumer. It should be kept in mind that a little more than the actual required amount of alcohol should be used in order to hold the oil permanently in solution, otherwise changes in temperature may cause precipitation.

In regard to coloring extracts, the laws of the various states differ somewhat, and it is always advisable to familiarize oneself with such matters before embarking in the manufacture of this class of products. As a rule, copies of the laws relating to food and drug products may be had for the asking, from the state officials entrusted with the enforcement of such laws and there is no excuse for anyone not being familiar with the legal requirements of the states in which they intend transacting business. It has been wisely said that "a stitch in time saves nine," and when it comes to matters of this nature it may also save serious legal entanglements.

For the most part, the laws regulating the sale of food products, both state and national, are very fair and equitable. It is only to the fakir and the uninformed that these laws are prejudicial and the man who is willing to offer his products for what they really are, need not fear any regulations which are likely to be made. In fact, such laws are a benefit rather than an injury to the honest manufacturer as they render it unnecessary for him to meet unfair competition.

So far as my knowledge of the matter extends, the following formulas comply in every way with the food laws of the various states and with the national law. It will be noted that I offer suggestions regarding coloring these extracts, leaving the manufacturer to be guided by the conditions surrounding him, whether his products shall be colored

or uncolored. Properly labelled, these extracts may be sold anywhere without fear of interference.

Vanilla Extract.

The vanilla bean is produced by a climbing parasitic plant, known botaically as Vanilla Plantifola. This plant is a fleshy, dark green, perennial, climbing plant with a long smooth stem much branched and supplied with aerial roots, which fasten themselves into the ground, and it depends for its support upon trees, or in cases where it is cultivated, upon a wooden framework.

The leaves are dark green, fleshy and veinless. The flowers are greenish yellow, about two inches in diameter and grow in clusters of eight or ten. The fruit is a slender pod, seven or eight inches long (?) filled with a oily pulp containing a large number of tiny black seeds. It begins to bear fruit three years after planting and continues to bear for 25 to 30 years, or even longer. The plant is grown in various sections of the tropical region, the principal sources of supply for them being Mexico, Tahiti (Island), Reunion and Madagascar (Bourbon beans) and Java. The kinds best known and most favorably thought of are the Bourbon and Mexican.. The principal section of Mexico where they grow is on the eastern coast in the State of Vera Cruz.

Most of the beans of commerce grow wild, although on account of the constantly increasing demand for them, some attempts have been made at their cultivation. It has been demonstrated that it is a comparatively easy matter to cultivae the plant and there seems to be no danger of any scarcity in the supply of this product. The method of propagation is very simple. A slip cut from the stem of the plant and planted near the trunk of a tree to which it is attached by means of a cord, immediately takes root in the bark of the tree and throws out aerial roots which, dropping downward, soon take root in the ground. The fruit is gathered

about the last of March, the collection period extending over a period of about three months. The pods are gathered before they are quite dry, wrapped in blankets and "sweat" until cured. Some of the oil of the bean oozes out in the process of sweating and the natives spread this smoothly over the bean, which gives it its glossy appearance. The beans are then sorted for length, packed in bundles and are ready for shipment.

The beans when freshly picked have little or no vanilla odor, this odor seeming to develop during the curing process. Great care is required in curing to get the maximum amount of vanillin and not to break the bean which would spoil its market value.

Formulas for the manufacture of vanilla extract from the bean are almost numberless. And it would appear that the formula to be followed or the particular process to be adopted is not of much importance, provided a sufficiently large quantity of the beans are used to each gallon and that the complete exhaustion of the strength of the bean has been secured. Various processes of exhausting the beans are in use, including maceration, digestion, percolation and a combination of any or all of these methods.

The vanilla bean is ranked among the most difficult substances from which to extract its virtues, especially by percolation alone. The chief difficulty encountered in percolating this substance is that it is practically impossible to pack it evenly in the percolator and, of course, the menstrum will follow the lines of least resistance so that a portion of the beans (those which are packed most closely) will not be subjected to its action sufficiently to extract the virtues therefrom.

The menstrum used in extracting the bean is a combination of alcohol and water in various proportions according to the idea of the operator as to what is the best proportion

to use. Generally speaking, two gallons of water to three of alcohol makes the most satisfactory menstrum.

Time is the most valuable factor in the production of a good vanilla extract, as anyone may demonstrate by comparing a recent product with one made under similar conditions, a year old. Various expedients have been tried from time to time, but have not proved satisfactory in hastening the ripening and it is now generally conceded that the principal difference in quality between the products of the large manufacturers and those of the man who makes them on a small scale, is that the former are in a position to allow their extract plenty of time to ripen before marketing it, while the latter often offers his product for sale as soon as it is made or at least within a few weeks from the time of making.

Various machines have been devised for the purpose of reducing vanilla beans to the proper condition for handling in the making of an extract. One of the best among these is the Vanilla Bean Chopper, made by John E. Smith's Sons Co., of Buffalo, N. Y. This machine cuts the beans without crushing them, which avoids heating the beans, which is a decided advantage. Personally, I have obtained good results from the use of an Enterprise food chopper, using a fine perforated disk with the knife operating on the outside of the disk.

The United States Pharmacopia directs a menstrum composed of two parts water and one of alcohol by weight, but in general use this is too strongly alcoholic. The strength above stated will be found more satisfactory in general use. Some difference of opinion exists as to the advisability of using glycerin in the menstrum, and it is quite generally conceded that its use is not an advantage.

The character of the beans upon which you are operating will determine largely the strength of the menstrum to be used. With the Mexican beans and others not containing an excess of mucilaginous matter, ordinary diluted

(50%) alcohol will give good results, while with stronger mucilaginous beans three parts alcohol to two of water will be nearer the required proportion.

The idea of using more alcohol with the latter is to avoid getting too much of the mucilaginous principle into solution, which would make filtration of the product very difficult. It is generally advisable to experiment on a small quantity of each new shipment of beans before making up a large quantity of the extract, in order to determine the most advantageous menstrum to use.

The requirements of the United States Food and Drugs Act of June 30, 1906, make the minimum quantity of vanilla bean to be used in an extract practically twelve and one-half ounces per gallon. The following formulas vary somewhat from these figures, none of them, however, using less than the minimum quantity specified. They will be found entirely satisfactory in practice and illustrate fully the various methods of extraction in common use.

I.

Vanilla Beans	10 pounds
Water	6 gallons
Alcohol	6 gallons

Cut or grind the beans fine, and place in a vessel provided with a closely fitting cover, pour over them two gallons of the water which has been heated to boiling, let stand for twenty-four hours, stirring occasionally, then add one gallon more water (boiling), and strain through a closely woven cloth, pouring the remainder of the water at a boiling temperature over the dregs on the strainer. After this liquid has cooled, add the alcohol, stir well and allow to stand until no further precipitation occurs. Decant the clear portion of the liquid, filter the remainder and mix the two solutions.

Most manufacturers prefer to macerate the beans for a longer period than called for in the above formula. Number

two makes use of the same quantities of materials but a somewhat modified form of extraction.

II.

Vanilla Beans	10 pounds
Water	6 gallons
Alcohol	6 gallons

Cut the beans small and place in a clean wooden keg, pouring over them the water which has been heated to boiling; after twenty-four hours add alcohol and continue the maceration not less than four weeks. Filter and add to the filtrate three quarts of rock candy syrup.

The addition of sufficient granulated sugar or rock candy syrup to vanilla extract to give a pleasant sweet taste is a decided improvement. It adds but little to the cost and will be found to impart a smoothness to the flavor which is unobtainable without its use. Some manufacturers use glycerin for this purpose and still others use both glycerin and syrup. The following formulas will illustrate the methods of procedure where glycerin or glycerin and syrup are used:

III.

Mexican Vanilla Beans	5½ pounds
Granulated Sugar	7 pounds
Alcohol	4 gallons
Water	3 gallons

Cut the beans in pieces from three-fourths inch to one inch in length, place in a porcelain jar and pour over them seven pints of the water at a boiling temperature. Cover closely and macerate for twenty-four hours. Now pass the beans through a chopper, having poured off the liquid which is reserved to be added to them later, grinding them as fine as possible. Put the beans back in the jar with the sugar and add the water previously drained off with an additional gallon of pure water. Macerate for twenty-four hours with frequent stirring; then add a gallon of alcohol; macerate

for one week and add another gallon of alcohol and after another week four pints of the alcohol. Allow the mixture to macerate for thirty days longer, then transfer to a percolator, covering with cloth and allow the liquid to drain off. Now mix the remaining portion of the water (9 pints) with the remainder of the alcohol (12 pints) and pass this through the beans in the percolator. Made in this way, no filtration is required and the extract is ready for immediate use, although it will continue to improve for several months.

The water used in this and all other extract formulas should be distilled water, provided this is easily obtainable. If not, a good substitute is water which has been boiled and then allowed to cool before using. By using water as it comes from the tap, it is often difficult to clear up the extract but the suggestions here given, if followed, will avoid any trouble in this direction.

IV.

Vanilla Beans	1 pound
Sugar (granulated)	1 pound
Water	2 pints
Alcohol	6 pints

Cut the beans small and bruise well with the sugar, place in a porcelain jar or wooden keg and pour over them the alcohol and water, previously mixed. Macerate in a moderately warm place for two weeks or longer if convenient; then filter.

Rock candy may be substituted for the sugar and if deemed desirable the alcohol may be reduced to five pints, using one pint additional water.

There is some demand for an extract made from vanilla and tonka beans, and if properly made such an extract will give good satisfaction. It should be remembered that an extract made in this manner cannot be legally sold as pure vanilla but should be labelled as Vanilla and Tonka Extract.

V.

Vanilla Beans	20 pounds
Tonka Beans	5 pounds
Alcohol	15 gallons
Water	15 gallons
Glycerin	1 gallon
Prune Juice	2 gallons
White Sugar Syrup	3 gallons

Cut or grind the beans as fine as possible and pack in a percolator, alternating layers of excelsior and the ground beans; close the opening at the bottom of the percolator, pour on the menstrum and let stand for twenty-four hours; then allow to percolate slowly, adding the glycerin, prune juice and syrup to the percolate. Store the finished product in wooden kegs or barrels. In common with all drug percolates this will deposit more or less on standing and should be racked off after three or four weeks, filtering the last portions and adding to the clear extract.

This makes a very strong extract and has frequently been made up using forty gallons of menstrum instead of thirty as called for in the formula.

Prune juice, called for in the above formula, may be had from any of the large dealers in essential oils, or a good substitute may be made from this formula:

Best Prunes	5 pounds
Alcohol	4 pints
Water	12 pints

Heat the water nearly to boiling and pour over the prunes. When cool add the alcohol and stand in a moderately warm place for ten days, keeping the vessel closely covered to prevent loss of alcohol. Strain off the liquid without crushing the fruit and filter if necessary. By stoning the prunes and cutting them up, the process of extraction may be hastened.

Vanillin and coumarin are rapidly gaining in popular favor. When these products were first put on the market they were received with much prejudice but this is rapidly being overcome and the consumption of these synthetic materials is increasing every year.

Vanillin does not exactly represent the flavor of the best vanilla beans, because in addition to the vanillin which these beans contain, there is an oil and a resin present in the beans in small quantities, which have a slight, though noticeable effect on the flavor. Many of the vanilla extracts made directly from the bean contain practically none of this oil or resin from the fact that the menstrum used is not strongly enough alcoholic to hold these substances in solution.

While to the expert there is quite a marked difference in the flavor of a vanilla extract made from the beans and a synthetic or artificial extract made from vanillin, to the average user of these products, this is not easily apparent, and in my own experience I have found the majority of cooks to prefer the artificial to the true extract. The artificial extract has greater apparent strength and does not "bake or cook out" as does the extract produced from the beans.

Though we may concede that a synthetic extract is not quite equal to the better grades of the true extract in delicacy of aroma, it cannot be disputed that a good synthetic extract is superior to a poor true one, and as a much smaller degree of skill is required to produce a first class synthetic flavor than for the production of a true extract of equal quality, it is quite easy to understand why the average manufacturer prefers to sell an extract of this kind rather than one made from the beans.

Vanilla beans may be had at all prices from seventy-five cents per pound up. The cheaper grades are worthless for extract purposes, or if they possess any value it is in giving

body to extracts made from vanillin and coumarin. The cheaper grades are sometimes used for this purpose, the extract obtained from their maceration being toned up with vanillin and coumarin to give the required "strength." There is an extract made from a low grade of beans with sufficient vanillin added to give it strength, and it is difficult for even an expert to distinguish it from the pure extract made from the better qualities of the bean. Although much of this kind of extract has been sold in the past for true vanilla, the practice is a questionable one and the use of low grade beans serves only to increase the cost of the product without adding anything worth mentioning to the quality.

There are formulas almost without number for the production of artificial or imitation vanilla extracts. Back of the time when vanillin had been produced synthetically, manufacturers used balsam of peru and benzoic acid combined with prune juice, molasses, etc., in imitating the flavor of vanilla, but at the present time such products are but little sold. A much superior article may be made from vanillin and coumarin at a much lower rate.

The fault of the average manufacturer is to use too much coumarin which, while it gives what at first appears to be a stronger extract, always possesses a peculiar "heavy" tonka flavor which is plainly discernable to a cultivated taste.

Some years ago the writer was connected with a firm which won considerable reputation for the quality of its artificial extract of vanilla. The formula used is as follows and it will be found to produce a very superior product:

Vanillin	6 drams
Coumarin	2 drams
Alcohol	2 pints
Water	5 pints
White Sugar Syrup	1 pint
Glycerin	½ pint
Caramel Color	Enough to give color desired

Dissolve the vanillin and coumarin in the alcohol, add the water and lastly the syrup and glycerin. Take a pint of the finished extract and add caramel drop by drop until the desired color is obtained; then color the remainder in the same proportion.

The syrup used in the above formula is made on the basis of eight pounds of soft white or granulated sugar to four pints of water, dissolving the sugar in the water by means of heat. The above quantity of sugar and water will produce one gallon of syrup.

This is often sold uncolored as "White Vanilla," although such a title would seem objectionable under the present food laws. If it is desired to market this in an uncolored or water-white condition, care must be taken that it comes in contact with no alkalies of any kind, even the amount of alkali which sometimes dissolves out of a new bottle serving to turn the extract red. All danger from this source may be avoided by adding to each gallon of the extract ten to twenty drops of pure acetic acid, which will serve to neutralize any alkali with which it is likely to come into accidental contact.

The following formula makes a good compound vanilla and vanillin flavor. It is used by one manufacturer who has won a reputation for producing extracts of the finest quality and may be made up at a reasonable cost:

(A.)

Mexican Vanilla Beans	1 pound
Bourbon Vanilla Beans	1 pound
Water	2 gallons
Alcohol	2 gallons
Glycerin	26 ounces
Rock Candy Syrup	2 pints

Grind or cut the beans small and place in a porcelain jar or clean wooden keg; pour over them the water at a boiling

temperature and macerate for twenty-four hours. Then add the alcohol and glycerin and macerate for forty-eight hours; lastly, add the rock candy syrup, stir well and macerate for not less than four weeks.

(B.)

Vanillin	2 ounces
Coumarin	½ ounce
Alcohol	2 pints

Mix and let stand for twenty-four hours; then add one pint rock candy syrup, and let stand for twenty-four hours longer; add one pint prune juice and let stand for twenty-four hours; then add five pints boiling water and let stand for two weeks. Filter.

To make the extract, add one quart of solution (B) to one gallon of solution (A).

The same manufacturer uses the following formula for producing a second quality of extract. This grade is quite popular with hotels and other large users.

Mexican Vanilla Beans	1 pound
Bourbon Vanilla Beans	1 pound
Tonka Beans	6 ounces
Boiling Water	2 gallons
Alcohol	2 gallons
Rock Candy Syrup	2 pints
Glycerin	1½ pints
Prune Juice	2 pints

Grind the beans fine and pour over them the boiling water; after macerating for twenty-four hours, add the alcohol and other ingredients and continue the maceration for four weeks or more, then filter.

This product should be labelled Compound Vanilla and Tonka Flavor.

Next to vanilla, in selling qualities, comes lemon. The process of making extracts from essential oils is very sim-

ple, it only being necessary to dissolve the oils in the menstrum, let stand a few days and after adding the color, if same is considered advisable, filtering the product.

It would seem unnecessary to give specific formulas for lemon flavor made directly from the oil, the table of minimum strength and the succeeding information covering all features of the work. The same applies to such flavors as cinnamon, cloves, nutmeg, peppermint, wintergreen and all other flavors made from essential oils. Simply use the desired quantity of the oil, making sure that this is not below the minimum quantity specified and dissolve it in the proper strength of alcohol, adding color when deemed desirable, then filtering.

In filtering extracts made from oils, it is generally necessary to use something in the nature of a clarifying agent. For this purpose, carbonate of magnesia is well adapted. All that is required is to put a small quantity of this material into the filter, after the filtering paper is in place and pour in the extract. It is always advisable to receive the last portions of the extract which pass through the filter in a separate vessel from that used for the earlier portions of the filtrate and reserve this last portion for use in the next lot of extract made. By this plan there will be little trouble from the clouding of extracts on standing after they are filtered.

Some manufacturers make what is known as a Compound Lemon and Citral flavor. This is made by using lemon oil in connection with citral, a product occuring in pure lemon oil and to which it largely owes its odor and flavor, but more freely in the oils of lemongrass or verbena. Ordinary lemon oil contains only from five to seven per cent. of true flavoring material, the remaining ninety-three to ninety-five per cent. being made up of terpenes. It is these terpenes which make the oils containing them so difficult to dissolve, terpeneless oil, i. e., one which is freed

from terpenes by fractional distillation, dissolving in very dilute alcohol without any cloudiness. Citral does not represent the true lemon flavor, holding about the same relation to lemon oil that coumarin does to vanilla, and while a very "strong" extract may be made by employing this material, it always gives a "heavy" odor and taste to the product, which is easily recognized by anyone familiar with the materials used.

By using citral, it is possible to use a more dilute alcohol as a menstrum. It is a valuable addition in the so-called "soluble extracts," being used in combination with terpeneless oils for making these products. Soluble extracts are largely used by bottlers of soft drinks, who find that ordinary extracts make a milky instead of a clear solution when mixed with the carbonated water and syrup.

The proportion of citral used to a gallon of extract will vary with the purpose for which the extract is intended and the selling price. A common mixture is one and one-half drams of citral, three and one-fourth ounces of oil of lemon, five pints of alcohol and three pints of water, to which is added the desired coloring matter.

Another formula calls for twenty ounces of oil of lemon, five drams of citral, three gallons of alcohol and two gallons of water with the desired coloring matter. The citral and lemon oil are dissolved in the alcohol, the water added gradually with constant stirring and the extract filtered through carbonate of magnesia. The last pint of the filtrate should be collected in a separate container and will contain a large excess of oil, the pint being nearly equal in strength to eight ounces of ordinary oil of lemon. It may be employed as the equivalent of this in future lots of the extract.

I have found it advisable in my own experience, where a large amount of water is to be used in an extract, to dissolve the oils, etc., in about three-fourths of the entire quantity of alcohol called for by the formula, then add the water

to this, slowly with constant stirring and lastly add the remainder of the alcohol. Just why this should make any difference in the result I am not in position to state, but I find that I get a clearer solution with less trouble by this method than by any other.

Having thus far covered the manufacture of all extracts made from essential oils, I shall devote a little space to the so-called Artificial Fruit Oils. The formulas given herewith are taken from a manuscript work by a prominent French chemist, and I have found them very satisfactory in use.

Oil Apricot, Artificial.

Chloroform	10 parts
Ethyl Butyrate	100 parts
Ethyl Valerianate	50 parts
Ethyl Salicylate	20 parts
Amyl Butyrate	10 parts
Glycerin	40 parts
Alcohol	1000 parts

Mix and dissolve.

Oil Apple, Artificial.

Chloroform	10 parts
Nitrous Ether	10 parts
Aldehyde (ethyl)	20 parts
Ethyl Acetate	10 parts
Amyl Valerianate	100 parts
Glycerin	40 parts
Alcohol	1000 parts

Mix and dissolve.

Oil Banana, Artificial.

Ethyl Butyrate	1 part
Amyl Acetate	1 part
Alcohol	5 parts

Oil Cherry, Artificial.

Ethyl Benzoate	5 parts
Ethyl Acetate	5 parts
Ethyl Œnanthate	1 part
Benzoic Acid	1 part
Glycerin	3 parts

Oil Currant, Artificial.

Ethyl Acetate	5 parts
Ethyl Benzoate	1 part
Aldehyde	1 part
Benzoic Acid	1 part
Œnanthic Acid	1 part
Tartaric Acid	5 parts

Oil Lemon, Compound.

Oil Lemon	10 parts
Ethyl Acetate	10 parts
Ethyl Nitrite	1 part
Aldehyde	2 parts
Chloroform	1 part
Succinic Acid	1 part
Tartaric Acid	10 parts
Glycerin	5 parts

Oil Melon, Artificial.

Ethyl Butyrate	4 parts
Ethyl Formiate	1 part
Ethyl Sebacate	10 parts
Ethyl Valerianate	5 parts
Aldehyde	2 parts
Glycerin	3 parts

Oil Mulberry, Artificial.

Ethyl Butyrate	60 parts
Ethyl Acetate	30 parts
Tincture Orris	8 parts

Oil Nectarine, Artificial.

Tincture Vanilla	2 parts
Oil Lemon Compound	2 parts
Oil Pineapple, Artificial	1 part

Oil Orange, Compound.

Oil Sweet Orange	10 parts
Ethyl Acetate	5 parts
Ethyl Benzoate	1 part
Ethyl Butyrate	1 part
Ethyl Formiate	1 part
Amyl Acetate	1 part
Methyl Salicylate	1 part
Aldehyde	2 parts
Chloroform	2 parts
Glycerin	10 parts
Tartaric Acid	1 part

Oil Peach, Artificial.

Ethyl Formiate	5 parts
Ethyl Butyrate	5 parts
Ethyl Acetate	5 parts
Ethyl Sebacate	1 part
Ethyl Valerianate	5 parts
Oil Bitter Almond	5 parts
Aldehyde	2 parts
Glycerin	5 parts
Amyl Alcohol	2 parts

Oil Pear, Artificial.

Ethyl Nitrite	50 parts
Amyl Acetate	100 parts
Glycerin	100 parts
Alcohol	1000 parts

Oil Pineapple, Artificial.

Ethyl Butyrate	50 parts

Amyl Butyrate	100 parts
Chloroform	10 parts
Aldehyde	10 parts
Glycerin	30 parts
Alcohol	1000 parts

Oil Prune, Artificial.

Ethyl Acetate	5 parts
Aldehyde	5 parts
Oil Bitter Almonds	4 parts
Glycerin	8 parts

Oil Raisin, Artificial.

Ethyl Formiate	2 parts
Ethyl Œnanthate	10 parts
Methyl Salicylate	1 part
Aldehyde	2 parts
Chloroform	2 parts
Glycerin	10 parts
Tartaric Acid	5 parts
Succinic Acid	3 parts

Oil Raspberry, Artificial.

Ethyl Benzoate	10 parts
Ethyl Formiate	10 parts
Ethyl Nitrite	10 parts
Amyl Acetate	50 parts
Aldehyde	10 parts
Glycerin	40 parts
Saturated solution of Tartaric Acid in cold alcohol	50 parts
Alcohol	1000 parts

Oil Strawberry, Artificial.

Ethyl Butyrate	50 parts
Ethyl Formiate	10 parts
Ethyl Nitrite	10 parts
Ethyl Salicylate	10 parts

Ethyl Acetate	50 parts
Amyl Acetate	30 parts
Amyl Butyrate	20 parts
Glycerin	20 parts
Alcohol	1000 parts

Oil Wild Cherry, Artificial.

Ethyl Benzoate	5 parts
Ethyl Acetate	10 parts
Oil Bitter Almond	2 parts
Benzoic Acid	2 parts
Oxalic Acid	1 part

NOTE.—The oxalic acid in the formula last given is used as an oxydizer.

In making up the artificial extracts from the fruit oils, sufficient of the oil is used to give the desired strength, and this is dissolved in a menstrum composed of three parts alcohol and five parts water. Any color desired is added, if allowable, and the product filtered if not entirely clear. It is quite difficult to specify definite quantities of oil to be used, but generally speaking, six ounces of oil to a gallon of menstrum will make a flavor of good strength.

The addition of one or two ounces of vanilla extract to each gallon will improve most artificial extracts, the use of a small quantity of this flavor giving a smoothness to the extract not obtainable by any other means. Strawberry is the only one of these which does not blend nicely with the vanilla. It should be kept in mind that all artificial extracts should be well aged before selling, as they improve greatly on standing. I have some specimens of artificial strawberry and raspberry extracts made six years ago, which have been carefully stored and they are far superior to anything else of the kind I have ever seen.

The nomenclature of the various ingredients mentioned in the formulas for Artificial Fruit oils may be slightly puz-

zling to those who are not familiar with the chemical names of the materials. In order to clear up any doubts on this point I append a list of the principal ingredients giving their chemical and common names:

Ethyl Acetate	=	Acetic Ether
Ethyl Benzoate	=	Benzoic Ether
Ethyl Butyrate	=	Butyric Ether
Ethyl Formate	=	Formic Ether
Ethyl Nitrite	=	Nitrous Ether
Ethyl Œnanthate	=	Œnanthic Ether
Ethyl Sebacate	=	Sebaic Ether

The amyl ethers as amyl acetate, etc., are commonly known by their chemical names, so no difficulty will be met with in connection with these.

Some further formulas for fruit flavors may prove of interest, therefore I append some which are in common use, including those made directly from the fruits and from a combination of ethers, etc.

Banana.

I.

Banana Fruit, peeled	1 pound
Alcohol	1 pint
Water	1 pint

Macerate for two weeks, express and strain.

II.

Amyl Acetate	3 ounces
Amyl Butyrate	1 ounce
Chloroform	20 minims
Aldehyde	1 dram
Glycerin	4 ounces
Alcohol	2 pints

III.

Glycerin	2 ounces
Alcohol	25 ounces
Butyric Ether	2 ounces

Amyl Acetate	2 ounces
Oil of Lemon	20 drops
Warm Water	6 ounces

IV

Glycerin	5 parts
Butyric Ether	10 parts
Acetic-Amyl Ether	10 parts
Alcohol	100 parts

V.

Tincture of Orris	155 ounces
Amyl Acetate	2 ounces
Butyric Ether	2 ounces
Formic Ether	½ ounce
Oil of Lemon	2½ drams

Mix the ethers and oil and add to the tincture of orris. The tincture of orris for this formula is made by macerating one pound of powdered orris root in a gallon of alcohol for two weeks, then filtering. A similar product may be made by using thirty drops oil of orris to a gallon of alcohol.

The larger manufacturers use a tincture press, and after macerating the orris root in the alcohol for a sufficient time, place the mixture in the press and extract the liquid by powerful pressure.

An excellent "Cream Banana" may be made by adding vanilla extract to the artificial banana extract, using one part of the former to three of the latter. A similar effect will be produced by using one to two drams of vanillin to a gallon of banana extract.

Banana extract is generally colored yellow with a little tincture of tumeric or caramel.

Blackberry.

I.

Butyric Ether	1 ounce
Acetic Ether	½ ounce
Tincture of Orris	1 gallon

II.

Formic Ether	4	drams
Acetic Ether	1½	ounces
Amyl Butyrate	2	drams
Amyl Acetate	1	dram
Blackberry Juice	6	ounces
Glycerin	4	ounces
Alcohol	20	ounces

Blackberry soda water syrup may be substituted for the blackberry juice with good effect.

III.

Valerianic Ether	1	ounce
Oil of Lemon	1	ounce
Tincture of Orris	6	ounces
Saturated Solution of Tartaric Acid in cold alcohol	1	ounce
Alcohol	40	ounces
Warm Water	8	ounces

Blackberry extract is generally colored with caramel.

Cherry.

Acetic Ether	5	ounces
Benzoic Ether	5	ounces
Benzoic Acid	1	ounce
Glycerin	3	ounces
Œnanthic Ether	1	ounce
Oil Persico (peach kernel oil)	2	ounces
Alcohol	100	ounces

Dissolve the ethers, oil and acid in the alcohol and add the glycerin.

English Walnuts.

Coumarin	2	ounces
Oil of Rose	10	drops
Oil of Lovage	5	drops
Alcohol	80	ounces

Glucose and water equal parts sufficient to make	2 gallons

Dissolve the coumarin and oils in the alcohol and add to the glucose mixture. This is something new in the way of a flavoring extract and imparts a very pleasant nutty flavor to cakes, etc., in which it may be used. The nutty effect may be heightened by using more of the oil of lovage.

Grape.

I.

Œnanthic Ether	2 ounces
Formic Ether	2 drams
Aldehyde	2 drams
Grape Juice	8 ounces
Glycerin	4 ounces
Alcohol	20 ounces

II.

Œnanthic Ether	10 ounces
Aldehyde	2 ounces
Chloroform	2 ounces
Formic Ether	2 ounces
Methyl-salicylic Ether	1 ounce
Succinic Acid	3 ounces
Saturated solution Tartaric Acid in cold alcohol	5 ounces
Alcohol	100 ounces

Gooseberry.

Benzoic Acid	1 ounce
Cold saturated solution of Tartaric Acid	5 ounces
Acetic Ether	5 ounces
Succinic Acid	1 ounce
Aldehyde	1 ounce

Œnanthic Ether	1 ounce
Alcohol	100 ounces

Peach.

Concentrated Solution Sebacylic Acid	1 part
Amyl Alcohol	2 parts
Aldehyde	2 parts
Acetic Ether	2 parts
Formic Ether	5 parts
Butyric Ether	5 parts
Valerianic Ether	5 parts
Oil Persico (peach kernel oil)	5 parts
Glycerin	5 parts
Alcohol	100 parts

Pineapple.

I.

Amyl Butyrate	1 ounce
Butyric Ether	4 ounces
Sebaic Ether	1 ounce
Acetic Ether	4 drams
Amyl Acetate	4 drams
Pineapple Juice	4 ounces
Glycerin	4 ounces
Alcohol	30 ounces

II.

Amyl-Butyric Ether	10 ounces
Butyric Ether	5 ounces
Amyl-Acetic Ether	1 ounce
Oil Lemon	1 dram
Oil Sweet Orange	½ dram
Glycerin	3 ounces
Alcohol	100 ounces

Pineapple is generally colored a light yellow with tincture tumeric.

Raspberry.

I.

Acetic Ether	5 ounces
Formic Ether	1 ounce
Methyl-salicylic Ether	1 ounce
Nitrous Ether	1 ounce
Œnanthic Ether	1 ounce
Sebacyclic Ether	1 ounce
Butyric Ether	1 ounce
Benzoic Ether	1 ounce
Amyl-Butyric Ether	1 ounce
Succinic Acid	1 ounce
Saturated solution Tartaric Acid in cold alcohol	5 ounces
Glycerin	4 ounces
Tincture of Orris	100 ounces

Mix the succinic acid with the tincture, add the ethers and lastly the glycerin. This is improved by a small quantity of vanillin or vanilla extract. About 1 ounce to the above quantity.

II.

Fluid Extract Orris Root	1 pound
Acetic Ether	4 ounces
Œnanthic Ether	40 minims
Butyric Ether	20 minims
Alcohol (60%)	1 gallon

Mix and after standing a few days filter.

Raspberry extract is generally colored a dark red with tincture of cochineal.

Strawberry.

Acetic Ether	4 ounces
Butyric Ether	2 ounces
Amyl Acetate	1 ounce
Amyl Butyrate	1 ounce

Formic Ether	4 drams
Extract of Orris	4 ounces
Strawberry Juice	12 ounces
Glycerin	8 ounces
Alcohol	2½ pints

Strawberry extract is generaly colored red with tincture of cochineal or cudbear.

This very comprehensive list of formulas for artificial fruit flavors has been selected with great care and the formulas given will produce products equal to any of the artificial extracts now on the market. It is easily discernable that the formulas given differ greatly in strength of product and the flavors may be diluted to any desired degree with alcohol, or in many instances as with strawberry and raspberry extracts, with tincture of orris. With many of these formulas water may be used as a diluent, and should the addition of this cause cloudiness this may be removed by filtering through carbonate of magnesia. Those extracts in which tartaric acid is used should not be filtered through magnesium carbonate but through some inert substance like powdered talcum.

The general rule for mixing all these extracts is to add the materials to the alcohol, adding the glycerin and water last. It should be kept in mind that etherial extracts are pleasant only in very dilute solutions and that if the extract is made too strong it will not be properly appreciated.

It would be difficult to recommend particular formulas among this list to the exclusion of the others. While there is considerable difference in the products of the different formulas for a single extract, the general result is practically the same and the manufacturer must be guided by his own judgment and the cost of production as to which formulas he will employ.

The foregoing includes all most popular flavors, with the possible exception of Pistache, which is made as follows:

Pistache.

I.

Oil of Bitter Almonds	50 minims
Aldehyde	1 dram
Œnanthic Ether	1 dram
Glycerin	2 ounces
Pistache Nuts	2 ounces
Alcohol	12 ounces
Water	2 ounces
Chlorophyll enough to give the desired green color.	

Powder the pistache nuts rather coarsely; add the water and macerate for twenty-four hours, then add the remaining ingredients and macerate for twenty-four hours, then add the remaining ingredients and macerate for a week with occasional agitation. Filter.

II.

Oil Sweet Orange	6 drams
Amyl Acetate	4 ounces
Benzaldehyde (Artificial Oil Bitter Almonds)	5 ounces
Butyric Ether	5 ounces
Acetic Ether	9 ounces
Alcohol	160 ounces
Water enough to make	250 ounces

Dissolve the first five ingredients in the alcohol and add warm distilled water enough to make 250 fluid ounces. Color with grass green coloring (chlorophyll) and filter.

FLAVORING POWDERS.

These are simply powdered sugar saturated with concentrated flavoring extracts, dried and re-powdered. They require but little skill in making and generally speaking are not as satisfactory as liquid extracts. In making a vanilla flavoring powder, powdered vanillin and coumarin are often

combined with sugar and in lemon, citral is often used. Some manufacturers include a small quantity of dried lemon or orange peel in the corresponding powdered extracts and others add a greater or less percentage of powdered citric acid to such flavors as lemon. The powders are sometimes colored to match the corresponding liquid flavors, this coloring being done by means of harmless liquid colors. For this purpose the concentrated food colors sold by large dealers in essential oils, etc., are most suitable on account of the comparatively small quantity required for the purpose.

Some typical formulas for flavoring powders follow:

Vanilla Flavor.

Vanillin	60 grains
Coumarin	8 grains
Powdered Sugar	1 pound

Lemon Flavor.

Soluble Oil of Lemon	30 minims
Citric Acid	1 ounce
Powdered Sugar	1 pound
Tincture of Turmeric	To color

Orange Flavor.

Soluble Oil of Orange	30 minims
Oil of Mandarin Orange	3 minims
Citric Acid	4 drams
Powdered Sugar	1 pound
Orange Color	Enough

Almond Flavor.

Benzaldehyde	2 drams
Powdered Sugar	1 pound

Any other flavor may be made by mixing the proper concentrated flavor or essential oil with powdered sugar.

In mixing, the oils, etc., should be mixed up thoroughly with a small portion of the sugar, allowed to dry and rubbed

free from any lumps. Then mix this with the remainder of the sugar by sieving.

FLAVORING TABLETS.

These are made by compressing the powder extracts into tablets by dry compression. See article on Tablet Making in the Medical Section.

THE MANUFACTURE OF SOAPS.

Soap, according to Webster, is a compound of one or more of the oil acids with a metallic alkali as soda or potash. Chemically speaking, it is a salt of a fatty acid.

Practically, soap is a substance, dissolving in water and forming with it a lather which may be used as a cleansing agent. It is produced by combining oils or fats with alkalies, the process being known as saponification.

The cleansing action of soap depends upon the fact that it is decomposed by a large quantity of water into free alkali and an insoluble acid salt. The first of these takes away fatty dirt on washing, and the latter forms the soap lather which envelopes the greasy matter and thus tends to remove it.

The making of soaps was among the first of the chemical processes to be utilized by mankind. The Gaula, it is stated by Pliny, manufactured a kind of soap from the combination of goat's fat with the ashes of the beech tree. A knowledge of the art was transmitted from this people to the Romans and from them has come down to modern nations. Another proof of the antiquity of this product is found in the fact that there has been unearthed from the long buried ruins of Pompeii a comparatively complete soap maker's establishment. The destruction of this city occurred in the year 79 of our era, and references to soap in the Scriptures (Jeremiah, 2-22 and Malachi, 3-2) go to prove that it may have been known at a considerably earlier period.

However, it was not until the researches of Chevreul in 1823, resulted in establishing the composition of olein, palmitin and stearin which make up the bulk of fat proper, that soap making took on a scientific aspect. From that time on, improvements have been almost constantly made in the methods of producing and finishing soaps, until to-day this is one of the most nearly perfect processes known to science.

Under present conditions soaps are produced by the saponification of tallow and other fats or some one or more of the vegetable oils as olive, cocoanut, etc., with soda or potash, the former giving the hard soaps and the latter the soft soaps of commerce. In practice a combination of two or more fats or oils are almost invariably used instead of a single one, experience having proven that in this way not only can better soaps be produced but the operation of making is rendered easier by the use of such combinations.

The discovery of the LeBlanc process of preparing caustic soda from common salt revolutionized the soap making industry. Up until this time practically the only source of alkali for this work had been the leaching of wood ashes, but the discovery already alluded to, which occurred almost simultaneously with Chevreul's discovery of the true nature of neutral fats, put the industry on an altogether new and more scientific basis.

The LeBlanc process which has now been largely superseded by the Solvay Process consists in treating sodium chloride (common salt) with sulphuric acid in which the stronger sulphuric acid replaces the hydrochloric acid in the salt molecule, transforming it into sodium sulphate and liberating the hydrochloric acid. The hydrochloric acid is then separated by distillation and saved by condensation in water. The crude sodium sulphate which remains is technically known as "salt cake."

This "salt cake" is then mixed with limestone and coal in the proportions of ten, ten and seven and a half parts respectively, and the mixture heated in a reverberatory furnace until the mass fuses. Two reactions take place. The carbon of the coal withdraws oxygen from the salt cake, leaving sodium sulphide, which is in turn acted upon by the limestone, forming by double decomposition calcium sulphide and sodium carbonate. The resulting product is then known as "black ash." By treating this with water the sodium carbonate is dissolved out, leaving the calcium sulphide, which is insoluble, behind. The water is then evaporated, leaving the carbonate of soda in crystals. To produce the dry carbonate, commonly known as soda ash, these crystals are calcined, thus driving off the water of crystallization and leaving the soda in powdered form.

The Solvay Process is even simpler in its application. In this the salt is dissolved in aqueous amonia and a current of carbonic acid gas (carbon dioxide) passed through the solution. The result of this is the formation of sodium bi-carbonate and ammonium chloride. The bi-carbonate is then heated, during which process it changes to the ordinary carbonate. From the ammonium chloride we may recover the ammonia, by mixing with quicklime and heating, so that the process is a very inexpensive one. If carefully conducted the loss of ammonia will not exceed one ton of ammonia to two hundred tons of soda manufactured.

Caustic soda is obtained from sodium carbonate. The latter is dissolved in water and mixed with milk of lime. Calcium carbonate is deposited as an insoluble white powder and caustic soda remains in solution. This solution is then boiled down in iron pans until it is thick enough to solidify. The result is a white solid having a strong soapy feel and acting corrosively upon the skin. It is one of the strongest alkalies known.

Formerly, most soap manufacturers produced their own caustic alkali from the carbonate but this is now done only in a few of the largest factories. Caustic soda may be had securely sealed in metal cans holding from ten to several hundred pounds, at a low cost, so there is no necessity of the small manufacturer attempting to make his own caustic alkali.

Theoretically, soap making is one of the simplest of chemical operations, but in putting the theory into practice difficulties are sure to be met with which can only be overcome by much study and experiment. These difficulties lie, not so much in the production of a commercial quality of this commodity as in doing this at a sufficiently low cost that a fair profit on the work can be realized in the face of the keen competition which exists among soap manufacturers. These points are of the utmost importance on account of soap being so staple an article that competition has forced the price down to such a point that any expense, no matter how slight, above what is actually necessary to the production of a good quality of the product is sure to prove a serious drain upon the profits of the business.

While it is true that soap can be made in small lots with no further apparatus than the utensils generally found in any well equipped kitchen, existing trade conditions, set forth in the preceding paragraph, render it difficult if not impossible to produce an article without the use of expensive and quite elaborate apparatus, which can be sold in competition with the products of the large manufacturers and leave a margin of profit sufficient to make the business a paying one.

I have already referred to the discoveries of Chevruel as establishing the nature of fats, but they went still further than this and established the true principles of saponification. Previous to his time it was supposed that the union of fats and oils with alkalies was due to some inherent

property of the fatty substances. Chevruel's researches proved that the oils and fats, instead of being simple substances are in reality compounds of various fatty acids, including the non-volatile stearic, margaric, palmitic and oleic acids with the addition, in certain fats, of volatile fatty acids as butyric, valerianic, etc., to which these fats owe their peculiar odor. These fatty acids are combined with a sweet material which the researches of Scheele resulted in isolating and to which the name, glycerin, is given.

It would require considerable explanation to make the theory of saponification perfectly plain to anyone not familiar with organic chemistry. Put in its simplest form, we may state that all fats are ethers of glycerin which in turn may be considered a trivalent alcohol, i. e., one in which the carbon and hydrogen are united with three atoms of oxygen.

When any fat, as palm oil, is saponified with caustic alkali, the ether as we have already stated the fat to be, is decomposed by the chemical reactions which occur, into an alcohol (glycerin) and a soda or potassium salt according to which of the alkalies is employed in the process, the salt in the case under consideration being sodium or potassium palminate or in common parlance soap. This brings us back to the statement at the beginning of this section that soaps are in reality salts of the fatty acids. This matter will be rendered clearer by reference to the formation of salts in Section I.

The glycerin formed during saponification remains, after the separation of the soap, in the mother liquor or spent lye, and the recovery of this substance forms an important item in the business of soap making. Up to the time when methods of separating the glycerin from the spent lyes were discovered thousands of dollars' worth of this useful material were wasted every year, being thrown away in the waste lye.

Soaps are distinguished as hard soaps and soft soaps, the former being made with caustic soda and the latter with caustic potash. In the making of pure hard soaps, what is termed the "salting out" process is employed. This depends upon the fact that soaps are soluble in pure water but are insoluble in brine. Therefore, if we add salt to the contents of the kettle, after saponification is complete, the soap will be thrown out of solution, rising to the top of the kettle by virtue of its lower specific gravity. In practice, but little pure soap is produced, the soap maker aiming to keep as much of the spent lye as is possible in combination with the soap proper. To this end various substances known as "fillers" are added to the soap which enable it to absorb and hold in combination a large percentage of water. Sillicate of soda and ordinary starch are often utilized as fillers. Cocoanut oil soaps have the property of absorbing and retaining very large quantities of water, at the same time appearing firm and hard and this oil is often used in connection with tallow or palm oil in order to obtain advantage of this property. Wagner "Chemical Technology" states that a yield of 200 or 300 kilos of soap from 100 kilos of fat is nothing unusual, especially if water glass is used, and is also authority for the statement that the mixture of 100 kilos of oil, 70 to 80 kilos of resin, 300 kilos of sodium silicate with sufficient soda lye at 56° (Twadell's scale) to saponify the fat and resin, will yield 800 kilos of a product which sells as soap. (The kilo is a metric weight corresponding closely to two pounds in our system.)

From the above it will be seen that the manufacture of soap offers many opportunities of increasing the profits of the business by the addition of adulterants which not only increase the output by their own weight but also cause the soap to absorb and permanently retain a large percentage of water. It should be kept in mind, however, that such ad-

ditions result in the production of an inferior article and soaps made in this manner cannot be termed high grade.

In view of the fact that soap making on a commercial scale is impracticable without the expenditure of several thousand dollars in equipment for the work, I shall not go deeply into the details of its manufacture. To those who desire complete information on the subject, I would recommend the reading of such standard works as Watt's "The Art of Soap Making" and the sections devoted to this subject in Sadtler's "Industrial Organic Chemistry," and Wagner's "Chemical Technology." The man who is prepared to equip a factory for the work will generally prefer to obtain the services of an experienced soap maker, instead of taking chances on experimenting with the work personally; the man who is not in position to purchase the necessary apparatus for carrying on the work expeditiously and economically had better devote his attention to some line where the competition is not as strong as it is on soaps.

The apparatus required for the production of soap on a commercial scale includes a boiler and engine to furnish the steam required for heating the materials and power for driving the machinery, kettles or boilers in which the saponification of the fats or oils is accomplished, "crutching" apparatus for stirring the soap in the process of manufacture and to facilitate the admixture of any "filler" which may be used, a series of "frames" to receive the finished soap, tanks for preparing the lye, machinery for cutting the soap into cakes or bars, stamping presses for finishing the bars, drying racks for "seasoning" the soap, trucks for conveying materials and finished product from one part of the factory to another, pumps, hydrometers, thermometers, dippers, pails, etc., galore.

The kettles are generally set in brickwork or masonry and are either of the "steam jacket" variety or provided

with coils inside to admit steam for heating the materials during the process of saponification. The coils used are of two kinds, open and closed. With the former the steam is admitted directly into the kettle through a series of perforations in the coil; in the latter the steam is confined to the coil itself. Some kettles now in use are provided with both forms of coils. The kettles are provided with outlet pipes controlled by stop cocks, through which the spent lyes and waste materials may be drawn after the separation of the soap.

The crutching machines are similar in construction to the kettles, in some cases being provided with steam jackets so as to keep the soap warm during the crutching process. The interior of these is provided with a series of wings or arms driven by gears and arranged in such a way as to thoroughly mix the contents. The soap is generally transferred from the kettles to the crutching machine by dipping or by means of specially constructed pumps. In the smaller factories the crutching is sometimes done by hand, the implement used for the purpose somewhat resembling a crutch, from which the operation takes its name.

The frames are built either of wood or of sheet steel, the wooden frames being provided with steel linings. They are mounted on trucks so as to be easily moved from one place to another and are so constructed that the sides and ends may be removed after the soap has cooled and solidified in a firm block.

The cutting or slabbing machines consist of a heavy framework of wood and a series of wires for cutting the soap. These wires are adjustable to different positions so as to give slabs of any desired thickness. In some machines the wires are stationary and the block of soap is forced against them by means of a gear mechanism while in others the soap remains stationary and the wires are forced through it by means of a sliding "slabbing-head." These are generally

operated by means of a crank which is turned by hand. The latest types of these machines do the cutting, trimming, racking and spreading the bars ready for the dry room, furnishing the cakes ready for the stamping press in one operation. In earlier times the cutting was done by means of a wire provided with two handles, the blocks being marked and the work of cutting being done by hand, two men pulling the wire through the block.

The remainder of the apparatus used has either been described elsewhere in this work or is of too simple construction to need particular description.

The machinery already treated comprises that required for the production of laundry soaps. For the manufacture of toilet soaps additional equipment is needed, in the way of re-melting apparatus, soap chippers, mills, plodders, etc., etc.

In general practice, toilet soaps are made by remelting ordinary soap, adding the necessary perfume and color, cooling, milling, plodding and forming in cakes stamped with any special design or lettering desired. In some processes the color and perfume are added to the soap without remelting, being combined with the soap in a dry state, after the latter has been reduced to small chips or shavings.

In milling the soap it is passed between rollers which reduce it to thin ribbons, and remove any excess of moisture which may be present. These ribbons are then passed through the plodder which delivers them in a compact continuous bar of any shape desired. The cakes are cut from this bar and placed in a stamping press which shapes them and impresses them with the desired designs or lettering. In the dry coloring and perfuming process, the color and perfuming material are mixed with the soap in the process of milling.

In the most improved types of soap factories, the apparatus used is all on one floor, the machines being placed in the

order of their use, so that the soap travels in one continuous direction from the kettles to the wrapping tables, or else the machinery is located on different floors so that the progress of the soap from the raw materials to the finished cakes is downward throughout, the kettles being located on the top floor of the building and the drying and wrapping rooms on the first floor. This method saves considerable labor in handling the soap during the process of manufacture and leaves the finished product where it can easily be loaded for shipment. The raw materials are generally stored in the cellar or basement, being conveyed to the top floor by means of elevators as needed.

The following description of what might be termed a "hand factory" for the manufacture of soap by the cold process, i. e., without boiling, was obtained from a party who operated such a plant for several years and gives full information for the equipment of a plant which will produce a marketable soap at a reasonable price and with the investment of a comparatively small amount of capital. Should you determine to take up the manufacture of this product in a small way, after what I have said as to the difficulties of competing with the large soap makers, I should, by all means, advise following these methods of operation.

The factory may be a one or two or three story building, preferably the latter, and its location is immaterial so far as surroundings are concerned, as in this process no objectionable odors are produced, as in the case of soap boiling. The prime requisite is that it should be convenient to some good shipping point.

A boiler of some kind is necessary to furnish the steam required in the process, the size of this depending upon the scale on which the work is conducted. A ten horse-power boiler will generally be found sufficient. Steam pipes must be provided to convey the steam to the melting tanks for the grease and to the dry room where it is used for heating.

The melting tanks may be built especially for the purpose or stout hogsheads may be used. They must be elevated so that the melted grease may be drawn from the bottom, and should be aranged on the opposite side of the room from the lye tanks.

The lye tanks are made from boiler iron or sheet steel, securely riveted together and should be about 4x6x6 feet in size. They are provided with a faucet or stop cock at the bottom and are elevated high enough that the mixing frames may be wheeled beneath them as described below.

The soap is made directly in the frames, these being built from two inch planks, grooved on bottom and ends and bolted together so that they may be taken apart after the soap has "set." These frames are lined with sheet iron or steel, as the soap would stick to wood if it came in contact with it. They are usually made 2x4x6 feet in size.

The cutting apparatus used consists of a piece of piano wire provided with two handles, which is used in slabbing the blocks of soap, as described in the paragraph on slabbing machines, and a table fitted with a sliding rack in which piano wires have been fitted to be used in cutting the slabs of soap into cakes. This table is fitted with a screw gear for drawing the wires through the slabs of soap.

For stamping the cakes the usual die press is used. These may be had from any dealer in soap maker's machinery.

The dry room is provided with racks for holding the soap, each rack carrying about fifty cakes. The cakes must not be allowed to touch each other during the drying process or they will stick together and look "mussy" when separated. The dry room is fitted with steam coils communicating with the boiler, running several times around the room so as to maintain the proper temperature for drying the soap.

The process of making the soap is very simple. The steam is turned on the melting tanks, until the grease is raised to a temperature of about 120° Fahr., or higher in cold weather, the exact degree not being material. The mixing frame is wheeled under the tanks and the proper amount of grease drawn into it. It is then wheeled to the lye tanks where a stream of lye is run in, and the crutching begun. This crutching is done by two men, using hand crutches, and must be continued for twenty minutes as rapidly as possible. This is the hardest part of the work and it really is work while it lasts. The crutching process must not be continued too long, otherwise the soap will again separate.

Where silicate of soda is used, it is mixed with the grease before adding the lye, the crutching serving to thoroughly combine it with the mass.

The soap is tested by blowing downward upon it and when it retains the impression it is considered done. Another method of testing is by dipping up a small quantity and dropping it back into the frame in small portions. When the soap is sufficiently heavy to retain the impression of the drops the crutching operation is complete.

The frame is then covered and left standing until the next day. It is then unbolted and taken apart. A frame of the size mentioned will hold about seven hundred pounds of finished soap. It will be noted that the crutching has thoroughly combined the lye with the grease used so there is no spent lye to be drawn off as with the usual method of boiling.

The block of soap is then slabbed by means of the wire and taken to the cutting table where the slabs are divided into cakes of the desired size and shape. These cakes are placed in the dry room until they have dried sufficiently to appear glazed on the outside, when they are placed in the stamping press and given the imprint desired. They are

then returned to the dry room where they are left until dry enough for shipment.

The main secret of success in making soap by the cold process is in using the proper strength of lye in saponifying the fats used. As all the lye used remains in the finished soap it can readily be seen that too much alkali should not be used, and on the other hand, it must be strong enough to completely saponify the grease or the soap will not be satisfactory.

The following figures are the result of long experience in the work:

Tallow requires 50 pounds of lye at 35 degrees Baume to each 100 pounds of fat, in order to completely saponify.

Cocoanut oil requires 55 pounds of lye at 35 degrees Baume to each 100 pounds in order to completely saponify.

Twenty pounds of lye at 32 2-5 degrees Baume should be used to each 100 pounds of silicate of soda.

The following formulas have proven excellent in practice:

I.

Tallow	235 pounds
Cocoanut Oil	25 pounds
Silicate of Soda	100 pounds
Lye at 35 degrees Baume	140 pounds
Pearl Ash Lye	25 pounds
Oil of Sassafras	1 pound

Heat the fat and oil to 120° Fahr. Put in the mixing frame with the silicate, add the perfume and then draw in the lye gradually with constant crutching as directed until saponification is complete.

II.

Tallow	175 pounds
Cocoanut Oil	50 pounds
Lard	25 pounds
Silicate of Soda	300 pounds

Lye at 35⅖° Baume	185 pounds
Pearl Ash	10 pounds
Perfume	1 pound

Mix as directed for No. 1.

III.

Tallow	155 pounds
Cocoanut Oil	20 pounds
Lye at 35° Baume	85 pounds
Pearl Ash	5 pounds
Perfume	10 ounces
Color	Sufficient

Mix as directed for No. 1.

This formula gives a good grade of toilet soap. Any number of different brands may be made from this same formula by changing the color and odor for each.

The lye used in all the above is made from caustic soda which may be had from any dealer in soap maker's supplies and materials. The soda is dissolved in water until a lye of the strength indicated is obtained. It is generally simpler to make it somewhat stronger than the strength required and then add water until the hydrometer indicates the correct strength.

Most of the yellow laundry soaps contain a considerable proportion of resin. Instead of being injurious to the soap, as the advertising of some firms would lead us to suppose, the best authorities agree in saying that a properly made resin soap is superior in detergent or cleansing power to those made from fats only, as well as being exceedingly emolient and pleasant to use. Watt, in his "Art of Soap Making," says, "A well-made resin soap is no doubt the most pleasant of all soaps for washing the skin."

Resin alone, will not make a true soap. It is easily soluble in alkaline lyes but in order to convert it into soap it must be combined with at least its own weight of some fat, as tallow. In using resin as an ingredient in soaps it is

usually introduced into the pan after the oils or fats have been saponified. While soap will take up an amount of resin practically equal to that of the fat used, generally from one-third to one-fourth this quantity is used. The resin is broken up in small pieces and after it is added to the soap, more caustic lye is run in and the boiling continued until a sample of the soap on cooling shows that the resin has been thoroughly combined with the remainder of the mass and that the soap has the proper "grain." After the soap has separated from the excess of lye, this excess is pumped out and an additional supply of lye at about 8° Baume is run into the pans. The steam is again turned on and the soap is kept well stirred for a time when the boiling is stopped, the soap again allowed to cool and the excess of lye pumped out, when the process is repeated with a lye at 4° and then with a very weak lye of 2° Baume. This process is known as purifying the soap, and when the soap has again cooled and the lye thoroughly separated, it is ladled into the frames or, in the larger factories, pumped into them. Sometimes a "filler" is crutched into the soap before it is put into the frames.

The following formulas will give an idea of the usual proportions of the different materials used in making laundry soaps:

I.

Tallow	2000 pounds
Resin	600 pounds
Soda Lye at 10° to 12° Baume	150 gallons

Further portions of lye must be added from time to time, after allowing the soap to rest and removing the spent lye from the pan. This process is repeated until the soap will divide into hard firm flakes when pressed between the fingers, and does not appear greasy or sticky.

II.

Cocoanut Oil	2072 pounds
Olive Oil or Tallow	168 pounds
Soda Lye at 25° Baume	325 gallons
Potash Lye at 20° Baume	60 gallons

The oils or fats are melted, then about ten gallons of the soda lye added, when this is united with the mass the remainder the soda lye is added in quantities of about ten gallons at a time, allowing each lot to thoroughly combine with the oil before adding a fresh supply. When all the soda lye has been added, boil for thirty minutes, then add the potash lye in the same manner as the soda lye was added. When all the potash lye is combined with the oil, boil for fifteen minutes, then add about 84 pounds of common salt by sprinkling slowly over the mass. Boil for thirty minutes longer, then allow to cool.

This makes a white, hard soap.

III.

Cocoanut Oil	1072 pounds
Raw Palm Oil	172 pounds
Bleached Palm Oil	336 pounds
Tallow	448 pounds
Resin	224 pounds
Common Salt	112 pounds
Soda Lye at 23° Baume	450 gallons

All the fatty matters and the resin are first melted in the pan and the process given in formula No. 2 followed in making the soap.

WASHING POWDERS.

Generally speaking, the manufacture of washing powders, apart from the production of the soap used in them, is not profitable. While a good powder can be made by mixing together powdered soap and the other materials employed for the purpose, this method of manufacture is

not an economical one and the production of powders on this plan will hardly permit competition with the large manufacturers who have facilities for crutching the soda ash, silicate of soda, etc., directly into the soap during the process of manufacture, grinding the same to a powder and putting up for sale. It will be found more profitable when such products are handled on a small scale to buy them in bulk from some reliable manufacturer, doing the packing, etc., yourself.

Commercial washing powders, consist of soap combined with any or all of the following materials:

Soda Ash, Sodium Carbonate, Borax, Sodium Silicate, Ammonium Chloride, Earthy Matters.

The last mentioned material includes such substances as fuller's earth, kaolin, etc. These are not used in high grade powders, being simply used as fillers or "make weights." Fuller's earth possesses some detergent qualities but these are not such that it can be employed to advantage in a soap powder, unless it is added with a view to lessening the cost of production.

The following formulas represent the composition of some of the powders now on the market:

I.

Curd Soap	10 parts
Soda Ash	6 parts
Sodium Silicate	4 parts
Crude Borax	2 parts

Dry the ingredients separately and mix well by sieving. All should be in moderately fine powder.

II.

Curd Soap	4 parts
Sodium Carbonate	3 parts
Sodium Silicate	2 parts

Prepare as directed for No. 1.

III.

Curd Soap	4 parts
Borax	1 part
Sodium Carbonate	8 parts
Sodium Silicate	1 part

Prepare as directed for No. 1.

Soap may be powdered by cutting into thin shavings with a carpenter's plane, drying these shavings by gentle heat and then grinding in a mill, or it may be purchased in powder form from almost any soap manufacturer.

WASHING FLUIDS.

These consist principally of solutions of various alkalies, such as potassium carbonate, ammonia, etc., designed to soften the water with which they are used and also to exert a detergent action.

The weight of such a fluid and the expense of bottles for putting it up, make its sale unprofitable, except locally, but a compound may be easily made which, when dissolved in water will make a first class washing fluid. This could be put up in cans the same as concentrated lye and similar products, and when packed in this manner could be transported both cheaply and safely. The following formula, although not a new one by any means, yields one of the best products of this kind which can be made:

I.

Concentrated Lye	1 pound
Ammonium Carbonate	1 ounce
Potassium Carbonate	1 ounce
Borax	1 ounce

Mix well, and pack in sealed cans or closely stoppered bottles.

The above quantity makes two gallons of superior fluid. In preparing it, simply put the powder into a stone or earth-

enware vessel and add the requisite amount of soft water, stirring until the powder is dissolved.

Directions for use are: Use half a pint (a teacupful) of the fluid to an ordinary boiler of water. Soak the clothes over night in clear water; in the morning wring them out and put into the boiler with the fluid and water; boil, rinse and dry. No rubbing is necessary unless on very soiled spots. The fluid is also useful in the boiler after the clothes have been washed in the usual manner. It renders the clothes clear and white and used in the manner first described will do away with most of the labor of washing.

II.

Turpentine	2 ounces
Stronger Ammonia (26°)	6 drams
Yellow Laundry Soap	8 ounces

Shave the soap fine and dissolve in water, adding the ammonia and turpentine which have been previously mixed. Put the whole into one-half tub of warm water and soak the clothes over night in the liquid. In the morning, rinse and dry.

This formula was obtained from a friend of mine, who claims that it is the "best ever." It does away with rubbing, boiling, etc., and leaves the clothes in perfect condition. If put up for sale, I should advise selling the ammonia-turpentine mixture only, directing this to be added to a solution of three-fourths cake of soap in water, and used according to the directions already given. Something might be added to disguise the ammonia-turpentine odor, if desired, nitro benzol or oil of citronella being best adapted to this purpose.

III.

White Hard Soap	1½ pounds
Stronger Ammonia	2 pints
Water	5 gallons

Cut the soap into thin slices and dissolve in two gallons of water by means of heat; add the remainder of the water, and when cool, the ammonia, stirring well. Bottle at ounce.

This is sold for washing clothes, and for scouring and cleansing fabrics of all kinds. For laundry use, one or two cupfuls of this are added to a boiler of water, and for general cleansing purposes a tablespoonful to a pint of water is about the right proportion. Used in the proportion of one or two tablespoonsful to a pail of water it is excellent for cleansing oil cloths, linoleums, paint, etc., as well as for scrubbing floors.

Quite often it is possible to save considerable money in purchasing bottles for this class of products by obtaining them from junk dealers. They are just as good as new for such purposes and the saving effected, where large quantities are used, is considerable.

WASHING COMPOUNDS.

During the past few years the market has been flooded with various so-called "washing compounds" for which the most extravagant claims have been made. There seems to be a wide demand for products of this kind and as they cost very little to produce, the profit on them is large.

These compounds, almost without exception, consist of paraffin with which some borax, soda ash, or similar substance has been mixed. Sometimes a coloring material is added. There is no doubt but that they save considerable labor in washing and while they probably do not do all that is claimed for them, they are really of considerable value.

The following formula is typical:

Paraffin Wax	10 pounds
Powdered Carbonate of Soda	1 pound
Borax	1 pound

Melt the wax and stir in the other materials in fine powder, continuing the stirring until the wax begins to "set"

so as to hold the powders in suspension. Then pour out into molds, or the mixture may be poured into tin trays to the depth of a half an inch and when nearly cold cut into cakes of the desired size. These cakes generally weigh about one-half ounce each.

If it is deemed desirable to color the product, the simplest method is to add a small quantity of some oil-soluble anilin to the melted wax before mixing with the other ingredients. By careful mixing, it is possible to use powdered blue, such as is used for laundry purposes, as a color. Where this is used the mixture must be continuously stirred until it has cooled sufficiently to prevent the separation of the powder.

The following directions, taken from the label of one of the commercial laundry tablets, applies to the use of all compounds of this nature.

Fill an ordinary wash boiler two-thirds full of water and slice into it one-half cake of common laundry soap. Place over the fire and while the soap is dissolving wet the clothes in water, rubbing all soiled parts with soap. When the water in the boiler is scalding hot, slice into it one cake of the compound, stirring until this is thoroughly dissolved. Put the clothes into the boiler and keep the water scalding hot for twenty minutes, stirring the clothes frequently. Take the clothes out of the boiler and rinse in warm water, wring and dry in the usual manner.

STARCH ENAMELS.

These are mixtures intended to be dissolved in the starch used for starching clothes, for the purpose of imparting to them a gloss on ironing. They consist, for the most part, of mixtures of paraffin, stearin, beeswax, etc.

An old formula which has gone the rounds of nearly every recipe book published during the last twenty years, calls for the use of paraffin wax scented with a little oil of

citronella. An improvement on this is to use stearin which, with borax, is the material generally used in the production of the so-called "gloss" starch. I have found the following formulas excellent:

I.

Stearin	1 pound
Paraffin	1 pound
White Wax	8 ounces
Borax	4 ounces

Melt the first three together on a water bath and stir in the borax while cooling. The mixture should be stirred until it begins to set and assumes a creamy appearance. Then pour out into trays to the depth of one-fourth inch and when sufficiently cooled stamp out into tablets the size of a five cent piece, using a tin cutter which may be made by any tinsmith.

Any desired perfuming oil may be added to the mixture, when in a melted state. It is best to add this just before pouring into the trays, stirring the perfume well through the mass.

One tablet is dissolved in each three pints of boiling starch and the starch used in the usual manner.

II.

Paraffin	1 pound
Beeswax	½ ounce
Spermaceti	1 ounce
Tallow	¼ ounce

Melt together and proceed as directed for No. 1.

III.

Borax	4 parts
Talc	3 parts
Cocoanut Oil Soap	1 part

Reduce all to a fine powder and mix well by sieving.

Use a teaspoonful to each quart of starch, mixing well.

LAUNDRY BLUING.

The older forms of bluing were made from Prussian blue and oxalic acid, but the more modern varieties make use of ultramarine.

Prussian Blue is an iron salt, produced by the interaction of sulphate of iron and potassium ferrocyanide. The alkali of the soap used in washing the clothes oxydizes this iron salt forming ferric oxide or ordinary iron rust, which accounts for the occurrence of rust spots on recently washed clothes which have been blued before drying. Unless the soap is entirely removed from the garments before bluing, these rust spots are almost certain to occur where a bluing made from Prussian blue is used. This action of an alkali on the iron salt may be easily demonstrated by dissolving a little soluble blue in hot water and adding a crystal of carbonate of soda. The color of the solution will change from blue to a reddish brown, showing that the iron has been converted into an oxide.

Another material used in commercial bluings is the so-called "water blue" anilin, i. e., a blue aniline, soluble in water. This is very powerful and would appear to make a cheap as well as a good product.

Ultramarine bluing is generally sold in the form of small cakes or balls, which are used by placing in a muslin bag and suspending in the water or stirred around in it until the desired color is obtained. These cakes are made by using a mixture of glucose and dextrin with the powdered ultramarine and sodium carbonate or bi-carbonate is often added as a "filler." The following formula makes a good bluing tablet:

Ultramarine	12 ounces
Sodium Carbonate	8 ounces
Glucose	2 ounces
Dextrin	½ ounce

Mix thoroughly, then add water enough to make a stiff paste. Roll into sheets and cut into cakes of the required size with a knife or tin cutter. Dry by gentle heat.

Indigo-carmine makes a good, but rather expensive bluing. Six parts of this substance combined with three parts of gum arabic and sixty parts of water gives a high grade liquid blue.

In making a cheap product from Prussian blue, one part of the so-called Chinese or soluble blue is mixed with from one-half to one part of oxalic acid and this is dissolved in boiling water, sufficient to make a bluing of the desired strength. A mixture of one ounce of Prussian blue, one-half ounce of oxalic acid and a quart of boiling water gives a good quality of product.

The "sheet bluing" which has been so largely sold throughout the country by means of the so-called "trust scheme" plan, is simply paper coated with the desired bluing material made into a paste with dextrin, glucose and glycerin. The directions generally given for this product are very indefinite, and I have never seen a practical working formula for sheet bluing published. The following, which was worked out after much experiment, will be found satisfactory and will give a product equal in quality to any of the sheet blues on the market. It should be kept in mind that it is impossible to produce sheet bluing with the glossy surface which is seen on some samples, without using steel rollers for pressing the sheets after they are coated with the bluing mixture.

Yellow Dextrin	3	pounds
Glucose	3	ounces
Glycerin	1	pint
Ultramarine	1½	pounds
Water	1	gallon

Dissolve the dextrin in the water by aid of gentle heat; add the glucose and glycerin and mix well; then stir in the

ultramarine, mixing until it is evenly distributed through the mixture. Take sheets of manilla paper and apply the mixture with a broad, flat brush, giving an even coating on one side of the paper. Hang up by means of paper clips and when dry coat the other side in the same manner. The solution may be made thinner by the use of more water and the paper dipped into the mixture, but I have found the above method preferable. If desired, a second coating may be given the sheets, after the first has dried, thus giving a bluing of greater strength. Indigo carmine or soluble blue may be substituted for the ultramarine if preferred.

The glucose and dextrin give body to the mixture and the glycerin is used to render the bluing freely soluble. The quantities of these materials may be varied slightly from the above proportions if deemed advisable, but any great excess of glycerin over the quantity specified will result in a very slow drying product.

CLEANSING COMPOUNDS.

Under this title I shall take up some of the products used for removing grease, paint, etc., from garments and fabrics of all kinds. These are sold in the form of liquids, pastes and in solid cakes, like soap.

An almost infinite number of formulas have been proposed, from time to time, for products of this kind, each of which has been claimed to be better than all the others. In reality, there is but little difference in these mixtures, all of them falling into two classes, viz., those consisting principally of soap and those making use of volatile solvents, such as alcohol, benzine, etc.

One of the oldest as well as one of the best products I have ever found for general cleaning purposes is that produced by formula No. 1 below. This has gone the rounds for so many years that it would seem almost every one is familiar with it, but as I am a firm believer in the theory

that a good *old* formula is much better than a poor *new* one, I shall offer this one as the best and cheapest liquid cleaner ever devised.

I.

Aqua Ammonia	1 pint
White Soap	10 ounces
Borax	4 ounces
Saltpetre	2 ounces
Water	1 gallon

Shave the soap small and dissolve in the water by means of heat, stir in the borax and saltpetre and when dissolved, remove from the fire. Allow to cool until it may be bottled without danger of breaking the bottles, then add the ammonia, stir well, and bottle at once. The handiest way of bottling this product, and for that matter almost any other liquid, where the work is to be done by hand, is to use a pitcher with a narrow mouth. In this way the liquid can be poured into the bottles without any danger of spilling. The above product should be bottled before it is thoroughly cold, as it becomes rather too thick to handle conveniently on cooling.

Directions for use: Apply with a sponge, rubbing to form a lather. Wash off with clear water. This will remove grease from any fabric which will bear cold water without spotting, without injuring the color in any way. For removing grease from coat collars, etc., it has no superior.

This product is also useful as an all around cleanser. It may be used on carpets, in cleaning painted woodwork (in which case it should be used in the proportion of about two or three tablespoonsful to a pail of water), for washing delicate laces, and in fact for almost all purposes where a cleansing compound is required.

II.

Tincture of Quillaya	1½ ounces
Benzine	½ pint

Add the benzine to the tincture in small portions, shaking thoroughly after each addition. The use of a little ammonia will be found to thicken the product and aid in emulsifying it.

Put up in collapsible tubes, and use by squeezing a small portion of the cleaner on the spot to be treated, rubbing with a damp sponge and then rinsing off with clear water. Any desired perfuming oil may be added.

III.

White Castile Soap	1 ounce
Alcohol	8 ounces
Glycerin	1 pint
Ammonia	1 pint
Sulphuric Ether	1 pint
Water enough to make	2 gallons

Dissolve the soap in the water by aid of heat, and when nearly cold add the remaining ingredients, shaking or stirring to form a smooth mixture. Put up in bottles and use as directed for No. 1.

IV.

White Laundry Soap	4 pounds
Caustic Soda	½ ounce
Carbonate of Soda	2 ounces
Borax	4 ounces
Oil Sassafras	6 drams
Water	6 pints

Cut the soap small and dissolve in the water by the aid of heat. Then add the remainder of the ingredients, except the oil of sassafras, and boil until on cooling it forms a paste of the desired consistence. Remove from the fire

and while cooling add the oil of sassfras, stirring it well through the mass. Pack in tin boxes.

In using, a wet sponge is rubbed over the paste and then on the spot to be removed, until a stiff lather is formed. Then rinse with clear water.

By using more soap, a product will be obtained, hard enough that it may be cut into cakes. The same result may be reached by continuing the boiling until sufficient water has been evaporated that the mixture when cooled will harden in a firm cake.

V.

White Soap	3 pounds
Borax	4 ounces
Potassium Carbonate	½ ounce
Water	2 pints
Oil of Sassafras	4 drams

Cut the soap in thin shavings and boil in the water until dissolved; then add the borax and potassium carbonate in small portions, stirring until thoroughly dissolved. The boiling should be continued until about half the water has been evaporated, or until a small portion allowed to cool will form a firm mass. Remove from the fire and while cooling stir in the oil of sassafras and pour into molds or trays. If trays are used, as soon as the mixture has become firm enough it should be cut into cakes about one inch wide, two inches long and one-half inch thick.

Wrap in waxed paper and place in a sliding box or else in a printed wrapper.

Use as directed for No. 4.

VI.

Gasoline	1 gallon
Chloroform	1 ounce
Borax	¼ ounce
Oil of Sassafras	¼ ounce

Oil of Cloves	¼ ounce
Alcohol	5 ounces

Mix the oils with the alcohol and add to the remaining ingredients, previously mixed.

Apply with a sponge, the same as other liquid cleaners, rinsing off with clear water.

VII.

Alcohol	2 ounces
Deodorized Gasoline	1 gallon
Oil of Cassia	½ ounce
Oil of Wintergreen	½ ounce
Sulphuric Ether	3 ounces
Borax	⅛ dram

Dissolve the oils in the alcohol and add to the other ingredients, previously mixed.

Use as directed for No. 6.

Nos. 6 and 7 are exact copies of the specifications of two patented products, the patents on which have expired.

INK AND RUST SPOT REMOVERS.

For removing ink from fabrics, there is nothing better than a concentrated solution of oxalic acid, followed by a solution of chloride of lime. Dip the spot into the acid solution, rubbing between the fingers until the ink is softened and as much as possible washed out, then wring dry and dip immediately into a concentrated solution of chloride of lime. Citric acid may be substituted for the oxalic acid, having the advantage of being non-poisonous, but it is somewhat more expensive. If put up for sale, the powders should be placed in separate bottles with closely fitting corks, the acid being marked No. 1 and the chloride of lime No. 2. Direct the user to make a solution by dissolving a teaspoonful of No. 1 in half a cup of warm water, and a solution of No. 2 in the same manner in a separate vessel. No. 2 should be strained through muslin before using. Proceed

as directed above, afterward washing the fabric in clear water to remove all traces of the chemicals.

As a rust spot remover, use potassium bin-oxylate. This may be sold as a powder consisting of equal parts of this chemical and cream of tartar, with directions to moisten the spot, rub the powder into it until the rust disappears, and then rinse in clear water. If a cream is wanted, make a solution of one ounce tragacanth in a pint of water by allowing to stand until the tragacanth is thoroughly softened and mixed with the water; then add four ounces of the powder made as directed above and about twenty grains of salicylic acid to act as a preservative. Put up in collapsible tubes.

Both oxalic acid and potassium bin-oxylate are highly poisonous and the mixtures should be kept out of the reach of children.

RAT AND MICE EXTERMINATORS.

The most effective exterminators for these pests are some of the strongly active poisons, such as arsenic, strychnine or phosphorous, combined with such materials as will make them attractive to the animals. It is impossible to give anything new in this line, so I shall content myself with reprinting several formulas which have proven effective.

I.

Phosphorous	1 ounce
Carbon Bi-sulphide	2 ounces
Lard	8 ounces
Wheat Flour	12 ounces

Dissolve the phosphorous in the carbon bi-sulphide, add to the melted lard and lastly make a uniform paste with the flour.

In handling the phosphorous solution, care should be taken not to spill it on the garments, hands or floor. A drop of this solution put on a sheet of paper will, in a few minutes

begin to give off vapors and then burst into flame, and serious results might follow its careless handling. When the mixture has been properly combined with the lard and flour, there is no further danger from fire.

II.

Lard	1 pound
Olive Oil	1 ounce
Phosphorous	½ ounce
Alcohol	1 pint
Wheat Flour enough to make a stiff paste	

Put the phosphorous and olive oil into a bottle, put this in a vessel of water and heat gently until the phosphorous dissolves. Melt the lard and pour the oil mixture into it, stirring well. Then add the alcohol and sufficient flour to make a mass which can be rolled into small pellets. Place these wherever the rats are troublesome.

Do not fail to caution the user regarding the extremely poisonous nature of the phosphorous.

III.

Strychnine Sulphate	1½ drams
Milk Sugar	1½ ounces
Prussian Blue	20 grains
Arsenic	3 ounces
Wheat Flour	12 ounces

Rub up the strychnine with the milk sugar, add the Prussian blue and arsenic, then combine this with the flour, mixing thoroughly. Moisten to form a dough; divide into cakes of the required size and dry by gentle heat.

IV.

Freshly precipitated Barium Carbonate	2 ounces
Sugar	½ ounce
Bread	8 ounces

Mix the carbonate with the sugar and then with the bread, adding a little water if necessary to form a mass. Divide into one hundred equal tablets.

This product is comparatively non-poisonous.

Tartar emetic is sometimes used instead of the barium carbonate.

ROACH EXTERMINATORS.

There is a great demand for preparations of this nature in many sections of the country and a product which does the work will always meet with a ready sale. There is not much mystery in regard to the composition of the powders now on the market, the active ingredient of practically all of them being borax.

The results of some analyses made by the United States Department of Agriculture a few years ago may prove interesting. Therefore, I reprint the following from Bulletin No. 68, of the Bureau of Chemistry:

"Peterman's Roach Food contains 20.60% of borax and the rest is either potato or pea meal, with a little red coloring matter."

"Hooper's Fatal Food is composed of 92.44% of borax and the rest corn meal, with a little red coloring matter."

"Legett's Roach Destroyer is composed of Persian insect powder tinted blue, and fortified with 22.22% of borax."

"Este's Roach Powder is borax with about 6.6% of pink coloring matter."

"Sure Destruction for Cockroaches and Ants is borax tinted with a little pink coloring."

"Bliss's Cockroach Exterminator is borax with about 8% of Persian insect powder and a small amount of pink coloring."

"Roach and Croton Bug Exterminator is a mixture of Persian insect powder, corn meal, 47.61% of borax and a little pink coloring matter."

"Roachine is borax with about 10% of Persian insect powder and a little blue coloring matter."

"Royal Roach Powder contains 30.94% of borax, about 55% of Persian insect powder and arsenic corresponding to about 13% of London purple."

The following formula, which is original with me, has been proven thoroughly reliable:

Borax	37 ounces
Starch	4 ounces
Sugar	3 ounces
Cocoa	4 ounces
Tartar Emetic	5 ounces

Reduce all to fine powder and mix thoroughly. The cocoa gives a brownish tint which may be deepened by the use of a little ochre or Venetian red.

Sprinkle freely wherever roaches are troublesome.

MOTH EXTERMINATORS.

Nothing better has been devised in the way of a moth exterminator, that the so-called tar camphor or napthalin, which is well known in the form of camphor flakes and moth-balls. This is sometimes mixed with other materials, designed to disguise its real nature and occasionally a portion of Persian insect powder is used with it, which doubtless increases its efficacy, this powder alone being an excellent moth exterminator.

The following formulas are typical:

Moth Bricks.

I.

Powdered Tar Camphor	4 ounces
Powdered Black Pepper	4 ounces
Cedar Wood Sawdust	4 ounces
Powdered Cinnamon	4 ounces
Powdered Soap	1¼ ounces
Powdered Myrrh	1¼ ounces

Oil of Lemon	1 dram
Wood Alcohol enough to make a stiff mass	

Mix the oil of lemon with the pepper, add the rest of the powders and mix thoroughly, then sprinkle over the mass enough deodorized wood alcohol (Columbian spirits) to enable you to work the powders into a stiff mass. Form into blocks about 3x1½x¾ inches, and wrap in tinfoil, then in a printed wrapper.

In use, the paper and tinfoil are removed and the brick laid among the articles to be protected.

The above formula comes from among the collection of Dr. R. P. Brook, and is given in its original form. In my opinion, a better brick could be made by using a solution of dextrin instead of the wood alcohol in making into a mass. About one ounce of dextrin to a pint of water will give a solution of the proper consistence.

A cheaper form of this specialty is sometimes made as directed below:

II.

Plaster of Paris	1 pound
Powdered Black Pepper	2 ounces
Powdered Napthalin	3 ounces
Oil of Lemon or other perfuming material enough to scent.	

Mix the powders, and then add sufficient water to allow of making the mixture into bricks or cakes. This should be pressed into tin molds of the desired size, first lining the molds with paper to insure the easy removal of the block.

Moth Camphor or Lavender Flakes.

Lavender Flowers	1 pound
Tar Camphor Flakes	4 pounds
Oil of Lavender (cheap)	1 ounce

Mix well by rubbing together between the hands. Put up in boxes holding six ounces of the powder. The cheap-

est grade of lavender flowers answer admirably for this preparation.

Moth Paper.

This is an old formula, but one which will give a good preparation:

Carbolic Acid Crystals	1 ounce
Camphor	1 ounce
Oil of White Cedar	½ ounce
Benzine	1 pint

Napthalin or tar camphor may be substituted in whole or part for the gum camphor. It is even more effective and much cheaper. Either the flakes or the ordinary moth-balls may be used. They cost from three to five cents per pound.

Cut the camphor small and put it with the acid in a large bottle, pour in the benzine and shake thoroughly until dissolved, then add the oil and shake again. Keep away from fires and lamps when mixing. Pour some of the preparation into a shallow dish and dip pieces of 3x6 blotting paper into it. Saturate well and hang up or lay on plates to dry. The benzine will soon evaporate, leaving the paper permeated with the chemicals.

If you want the sheets of blotting paper printed do this before the dipping.

Wrap several sheets in cheap waxed paper; put up in a printed envelope.

Use the same as any moth preventive, packing it away with garments when storing them.

Moth Caskets.

Procure some small aluminum boxes, perforated with numerous very fine holes in the cover and bottom. Any firm making aluminum boxes can furnish such a box, provided enough are ordered to make it worth while to prepare the dies.

Inside these boxes, place small thin muslin bags filled with any of the well known exterminating compounds. Powdered napthalin, cedar wood sawdust and lavender flowers, in equal parts, with the addition of sufficient cheap oil of lavender to perfume makes a good combination for these caskets.

In use, the caskets are placed among the articles they are intended to protect. They keep the compound from coming into direct contact with the garments and being a novelty, ought to meet with a ready sale.

JELLY POWDERS, OR PREPARED GELATIN.

These consist of a good quality of gelatin combined with citric or tartaric acid, a flavoring material and some harmless color. Either the powdered gelatin may be used and the acid, etc., mixed with it or the gelatin may be dissolved in water, combined with the acid and the flavoring and coloring materials and dried in the form of thin sheets which are then cut into shreds by means of a specially devised machine.

The following formulas will show the proper proportions of the different materials:

I.

Gelatin	1 pound
Sugar	4 pounds
Powdered Tartaric Acid	1 to 3 ounces
Oil of Lemon	1 ounce
Harmless Yellow Color	Sufficient

This gives the lemon flavored variety. All other flavors are made in the same manner, the following quantities of flavoring materials being used to each pound of gelatin:

For Orange use oil of sweet orange	2 drams.	Color orange.
For Raspberry use essence of raspberry (artificial)	1 ounce.	Color red.

For Strawberry use essence of

strawberry (artificial) 1 ounce. Color light red.

The quantity of acid may be varied to suit the taste, and citric acid may be used instead of the tartaric if preferred. This will reduce the cost of manufacture slightly.

FOOD COLORS.

These colors are suitable for coloring food products of all kinds, where the law admits of the use of coloring matters. They are entirely non-poisonous and while they do not impart as intense colors as the anilines, are free from the objections to their use which apply to the aniline colors.

In that section of the Appendix, dealing with the use of colors in food products, will be found a list of the allowable aniline colors which may be used in the desired proportions to obtain the shade wanted. Quite a number of dealers in essential oils and similar products also sell what are known as Pure Food Colors, and it may be found advantageous to purchase such coloring material as you may need from one of these concerns instead of making your own.

Red.

Cochineal	1 ounce
Potassium Carbonate	½ ounce
Alum	½ ounce
Cream of Tartar	1 ounce
Alcohol	1 ounce
Glycerin	6 ounces
Water enough to make	1 pint

I.

Powder the cochineal up and rub in a mortar with the potassium carbonate and eight ounces of water; add the alum and cream of tartar separately, mixing well after each addition and then boil in a porcelain or enamelled kettle for fifteen to twenty minutes. Allow the mixture to cool, add

the alcohol and glycerin and filter, passing enough water through the filter to make the finished product measure one pint.

II.

Powdered Cochineal	1 pound
Cream of Tartar	2 ounces
Alcohol	1 pint
Water enough to make	2 pints

Mix the alcohol with a pint of water and dissolve the cream of tartar in the mixture. Moisten the cochineal with this liquid and pack in a percolator, pouring on the remainder of the mixed alcohol and water. Allow to stand in a warm place for forty-eight hours, then percolate slowly, adding sufficient water through the percolator to make one and three-fourths pints of the percolate. Set this aside and continue the percolation with water until one pint more has passed. Place this on the water bath and evaporate to four ounces, which mix with the first portion of the percolate.

This is sometimes called "Rubine" or Raspberry Coloring and is much used in coloring artificial fruit extracts.

III.

Powdered Cudbear	1 pound
Alcohol	1 pint
Water enough to make	2 pints

Grind the cudbear to a coarse powder, and proceed as directed for No. 2. This is suitable for preparations containing acid and forms much of the so-called "Fruit Coloring" sold by dealers in this class of materials. Alkalies turn it to a purple color.

IV.

Carmine No. 40	2 drams
Potassium Carbonate	1 dram
Glycerin	2 ounces

Ammonia (16°)	4 drams
Water	5 ounces

Rub the carmine with the potassium carbonate in a mortar, add the glycerin and rub again; now add the ammonia water, continuing the mixing, and finally add the water.

This gives an intense red color to all alkaline liquids but is precipitated by strong acids. It is not suitable for coloring strongly alcoholic tinctures.

This is often referred to as "Liquid Carmine."

Yellow.

I.

Tumeric	1 pound
Alcohol	1 pint
Water	1 pint

The tumeric should be in fine powder and macerated with the alcohol and water for a week or more, in a moderately warm place. Filter.

II.

Saffron	4 ounces
Alcohol	1 pint
Water	1 pint

Mix the alcohol and water, add the saffron and macerate in a warm place for a week or more, with occasional shaking. Then filter.

This has a deep orange color but in dilute solutions gives a fine yellow.

III.

Ground Fustic Wood	4 ounces
Alcohol	1 pint
Water	1 pint

Pack the fustic in a percolator, pour on sufficient of the alcohol and water, mixed, to cover it and let stand in a warm place for twenty-four hours. Then percolate slowly.

The quantity of fustic wood may be varied to give a coloring material of any desired intensity.

Caramel.

This is probably the most useful of the coloring materials used in food products. Used with discretion it imparts a series of colors ranging from a light yellow, through the orange shades to a "whiskey red," or deep amber. Generally speaking it will be cheaper and more satisfactory to buy this than to attempt making it; however, if it becomes necessary to prepare it on a small scale, the following process will be found convenient:

Place any quantity of sugar in a kettle and heat carefully over the fire until it caramelizes, i. e., becomes burned to a deep brown, almost black. Care must be taken not to carry this heating too far, otherwise it will be carbonized and become insoluble. After the mixture has been well burned, it will suddenly froth up, and the heat should be withdrawn when this occurs. For general purposes heating to about 420° Fahr., will be found satisfactory. After the sugar has been properly caramelized, water should be added (hot) in the proportion of one pint for each pound of sugar used, and the mixture heated and stirred until the caramel is dissolved. Then continue the heat with frequent stirring until it is of the consistence of heavy syrup.

In making caramel on a large scale, commercial glucose is generally employed instead of sugar, and the temperature is varied according to the use for which the product is intended. For coloring alcoholic solutions, a caramel prepared at a higher temperature than that used in making the water soluble product, is used.

Blue.

Use a solution of indigo-carmine.

Green.

Use a solution of chlorophyll or a mixture of indigo-carmine with any of the yellow colors given above.

SECTION VIII

MISCELLANEOUS SPECIALTIES.

ADHESIVES.

Under this head we may include a varied line of specialties, such as glues, cements, pastes, mucilage, etc.

Liquid Glues.

Liquid glues make a profitable specialty. They are solutions of ordinary glue in water, with the addition of sufficient nitric or acetic acid to prevent them from gelatinizing. An excellent preparation is yielded by the following formula:

Best Glue	1 pound
Nitric Acid	6 drams
Water	Sufficient

Soak the glue in just sufficient water to cover it, for twenty-four hours; then place in a double boiler and melt, adding the acid. Should you desire a thinner product, a little more water may be added when melting the glue.

A modification of this formula is given below. There is but little difference in the quality of the two products.

Best Glue	120 parts
Acetic Acid	10 parts
Water	130 parts
Alum	1 part

Soak the glue in the water until well softened, then put with the other materials into a glue pot or double boiler and heat until dissolved. Bottle at once.

Waterproof Glue.

Soak the best quality of carpenter's glue in water until it is well softened, but still retains its form. Pour off any excess of water and put the glue on a water bath with sufficient linseed oil to reduce it to a jelly when melted. It should be stirred almost constantly while melting and put up in wide mouth bottles. This glue sets very slowly but when dry it combines strength and hardness with water resisting powers to a marked degree.

CEMENTS.

There is no limit to the number of formulas which might be given under this head, hundreds of compounds having been suggested for each purpose for which cements are used. However, a careful inspection of the formulas offered for such products will make it easily apparent that there is a great similarity in these compounds, practically all, which are of any value, consisting of an adhesive material combined with something to act as a "binder" and increase its strength.

The nature of the cement to be used for any particular purpose will depend upon the nature of the materials to be united, and quite as much depends upon giving careful attention to the proper method of using the cement as upon the composition of the cement itself, in the attaining of satisfactory results.

Having neither time nor space to take up a discussion of cements, in general, I shall confine myself to those varieties which are of the greatest value from the standpoint of marketability. These will include cements for glass and china and a few other varieties in common use.

Glass and China Cements.

An ideal cement for mending broken glass and china ware would be colorless or nearly so, quick drying, strong, and capable of resisting both hot and cold water indefinitely.

Unfortunately a preparation which combines all these features has never been discovered, nor does it appear likely that such a one will ever be devised. There are insurmountable obstacles in the way of making a cement which would meet all these requirements and we are therefore obliged to content ourselves with products which approximate, more or less closely, this ideal.

A solution of India rubber or gutta percha in chloroform comes about as near a colorless cement as it is possible to obtain. In making this, about one part India rubber or gutta percha is dissolved in sufficient chloroform to make a solution of the consistence of thin syrup and sixteen parts of powdered mastic is then added to the mixture. Such a cement is fairly strong but does not resist the action of hot water.

In using this cement, the edges to be united, are thoroughly cleaned so as to remove all grease and dirt, taking care not to chip the thin places. The cement is then applied with a camel hair brush, in a *very thin* coating, the edges pressed carefully into place and secured by tying or in some other manner until the cement has time to thoroughly harden. Contrary to what seems to be quite a prevalent opinion, a thick coating of cement is not stronger than a thinner one, and much of the neatness of the job will depend upon not using an excess of the adhesive material.

A large variety of cements may be made from silicate of soda solution, or as it is commonly called, water glass. Used alone this makes a fairly good cement for glass and china, provided the broken pieces can be held securely in place during the drying process. Warming the edges to be joined is advisable when this material is used, and the same applies to the use of cements in which glue or gelatin is an ingredient.

Generally some binding material is combined with the water glass solution, when it is marketed as a cement. Finely ground kaolin, added to the solution in the proportion of about a dram of kaolin to two ounces of the silicate makes a cement which is almost pure white in color, and will set to a stony hardness in a few hours. Potassium silicate may be used instead of sodium silicate and is rather superior to it, especially when used alone.

By combining metal filings with sodium or potassium silicate, a great variety of useful cements may be made. For example, a mixture of whiting and fine zinc filings with a water glass solution (23° Baume) will give a product which closely resembles metallic zinc in appearance, and may be polished the same as the metal. It is much used for mending zinc ornaments. By substituting iron or brass filings for the zinc, other useful cements are made and almost any metallic powder may be used in connection with the water glass as a cement.

A formula which I have found very satisfactory in mending laboratory glassware, and which will resist the action of hot water to a considerable degree, is made as follows:

Best White Glue	1 pound
Dry White Lead	4 ounces
Alcohol	8 ounces
Water	2 pints

Soak the glue in the water until softened, then melt in a glue pot or double boiler; stir in the white lead, which should be in fine powder; remove from the fire and when cool add the alcohol in a slow stream, stirring constantly.

It should be put up in wide mouth bottles, being semi-solid when cold, and when desired for use is rendered fluid by placing the bottle in a cup of hot water. It does not dry as rapidly as some other cements, requiring about two or

three days to become perfectly firm. The broken pieces should be secured in place by means of cords until the cement has thoroughly hardened.

The so-called Armenian cement, the formula for which has gone the rounds for a number of years, is really a very satisfactory article, although it will not accomplish all that is claimed for it by some parties who assert that it will unite two pieces of polished steel so firmly that it is next to impossible to separate them. The formula is doubtless a familiar one to most of my readers, but in a somewhat improver form, reprinted by permission from The Practical Druggist, may prove of interest.

Soak four parts of Russian isinglass (the dried bladder of the sturgeon) in cold water for twelve hours, or until it has absorbed as much of the water as it will take up, then throw the isinglass in a strong piece of linen (a towel will answer) and squeeze out all surplus water. Upon the thoroughness with which this is done depends, to a considerable extent, the quality of the finished product. Put the fish glue in a capsule and melt it in the water bath. Have ready a solution of two parts of gum mastic and one part powdered gum ammoniac, dissolved in 16 parts of 95 per cent. alcohol. Remove the capsule from the bath, add the solution of gums to the glue and stir well together. This cement has a milky appearance and when properly made (and properly used) is one of the strongest possible cements for uniting porcelain, glass, ivory, etc. The cement remains fluid in very hot weather, but at other times is solid, and the container must be placed in warm or hot water to liquify the cement before using the latter. Have the fragments to be united warmed up to the temperature of the cement, or, even warmer will not hurt. Use as little of the latter as possible, but be careful to cover the broken edges of both pieces with it, adapt them as neatly as possible,

press out the surplus cement, and bind the parts together. Do not remove the binding thread or wire for at least 36 hours (and the joint will be all the better if the ligature is left on for twice that long.) To render this cement so that it will stand boiling water place the object in a hot oven and leave it there over night. Keep the containers of the cement tightly corked.

An alcoholic solution of shellac makes a good cement for glassware and chinaware and is waterproof up to the temperature of boiling water. By using bleached shellac a light colored cement may be obtained but this is scarcely as strong as that made from the orange variety.

Another cement which is greatly in vogue among street men and canvassers, is made by dissolving one part of French or Russian isinglass in two parts of strong acetic acid, by means of heat. A porcelain or enamelled kettle must be employed in making cements where acid is used as an ingredient. This cement hardens in the bottles and must be liquefied by placing the bottle in hot water when required for use.

An extemporaneous cement, which is scarcely suitable for commercial purposes, may be made by curding skimmed milk with acid and mixing the resulting casein with an equal quantity of powdered lime. This must be used as soon as mixed as it hardens rapidly. Casein is sometimes mixed with water-glass solution to form a cement for earthenware.

A useful liquid cement may be made by dissolving gelatin in an equal weight of water by heating on a water bath and then adding a sufficient quantity of zinc chloride to prevent the mixture from solidifying when cooled. Using one ounce each of water and gelatin, about five to ten grains of the chloride will be required. Begin by adding five grains to each ounce of gelatin used, and should the mixture solidify on cooling, add a little more until it remains liquid. If the finished product shows an alkaline reaction (i. e., turns

phenolpthalein solution or blue litmus paper red) sufficient hydrochloric acid should be added to neutralize it.

Among the silicate cements one made by combining powdered chalk with the water glass solution and colored by means of a suitable anilin dye, will be found useful for mending statuary, etc. The color may be made to match that of the article being repaired.

By using powdered glass mixed with sodium silicate, a very firm, quick setting cement is produced. This might prove a good selling product, putting up the powder and liquid separately, directing them to be mixed at the time of using.

Various formulas for waterproof cement have been published from time to time, depending on the action of chromic acid or bichromate of potassium in rendering gelatin insoluble, when combined with it and exposed to the light. Such a mixture would, no doubt, prove effective if used soon after mixing but if the product were kept for any length of time, it would very likely become worthless. In making such a cement, one-half ounce of glue or gelatin is dissolved in two ounces of water, in the usual manner, and mixed with a solution of forty grains of bichromate of potassium dissolved in an ounce of water. This gives a rather firm compound which may be made fluid by the use of more water, if a liquid product is desired.

Of the numerous stick cements, the following will be found to give the best satisfaction:

I.

White Glue	½ pound
White Sugar	¼ pound
Water	1 pint

Soak the glue in half a pint of water for twenty-four hours, then melt on a water bath, adding the remaining half pint of water and the sugar. Make a paper mold by wrap-

ping stiff paper around a rod of the desired size, and pasting the edges. Fit a plug into one end of this mold and pour in the glue mixture. When cold, cut into sticks three or four inches long. In use, the end of the stick is melted in a flame and rubbed over the edges to be united, these being pressed firmly together. The cement may be made harder or softer by using more or less glue. This resists the action of cold water for a considerable time.

II.

Orange Shellac	½ pound
Gutta Percha	¼ pound

Melt together on a sand bath and form into sticks. These may be made in the same manner as directed for No. 1 and the directions for use are also the same.

Paste for Labeling on Tin.

Much trouble is often caused by the labels coming off tin boxes, etc. This is generally due to one of two conditions: Either the surface of the metal is greasy or else the paste is of such a nature that it dries too hard. By thoroughly cleansing the surfaces to be labelled, almost any paste may be used with good results, provided it contains a little glycerin or some similar material to prevent its becoming too hard.

I have made paste by the following formula, superior to any of the highly advertised products and believe that this one formula alone will be worth many times the price of this volume to anyone who has to do any labelling on tin.

Lump Starch	1 pound
Aluminum Sulphate	2 ounces
Potash Lye (ordinary concentrated lye	2 ounces
Venice Turpentine	2 ounces
Cold Water	1½ gallons

Mix the starch and the aluminum sulphate with one-half

gallon of water, stirring until a uniform mixture results; dissolve the potash lye in one and one-half pints cold water, by stirring. Now add about two-thirds of the lye solution to the starch mixture, stirring until it becomes thickened, then add the remainder of the lye solution and one-half gallon more water. After stirring well, add the Venice turpentine, and stir until well mixed. If the paste becomes too thick more water may be added to reduce it to the desired consistence.

Directions for use: Have the surfaces to be labelled clean. Apply the paste to the labels with a brush and let stand for a minute before applying to the tin.

Powder Paste.

The pastes sold in powder form consist of starch combined with enough caustic soda to burst the starch granules when the powder is mixed with water. A mixture of five pounds of starch with one-fourth to one-half pound of powdered caustic soda will give a satisfactory product. In use, the paste ise rubbed smooth in a little cold water, and then sufficient hot water is added with constant stirring, to give a paste of the required consistence.

Photo Paste.

This is a fine grade of paste, generally made from white dextrin. It is often sold under the name of "Library Paste." In order to obtain a snow white product the finest quality of white dextrin must be used and the directions regarding ripening the paste carefully followed.

White Dextrin	5 pounds
Finest quality Gum Arabic (powdered	6 ounces
Water	1 gallon
Oil of Wintergreen	½ dram
Oil of Cloves	½ dram

Dissolve the dextrin and gum arabic in the water, which has been heated to about 160° Fahr. Allow to cool; then

stir in the oils and pour the paste into bottles. These should be stored in a cool place for several weeks, in order to properly ripen. In cold weather, it may be stored in any room, kept just above the freezing temperature. In summer, store in an ice box and hold the temperature between 40° and 45° Fahr.

Mucilage Pencils.

These are simply glue and sugar melted together and run into molds of the desired size and shape. A good combination is: Best glue, one pound; white sugar, one-half pound; water, sufficient to soften the glue. Put the glue in a vessel, adding water enough to nearly cover it; allow it to stand until softened, then put in a double boiler or glue pot and melt, evaporating as much of the water as possible. Add the sugar and stir well. When the sugar is melted and the whole forms a smooth mixture, pour out into molds. In use, it is simply moistened and rubbed upon the papers to be joined together. Any desired flavoring material may be added, just before pouring into the molds. Oil of wintergreen makes a cheap and pleasant flavor. The artificial oil will answer quite as well as the natural for this purpose and is considerably cheaper.

Office Mucilage.

I.

Gum Arabic	8 ounces
Glucose	32 ounces
Water	20 ounces
Acetic Acid (commercial)	1 ounce

Dissolve the gum in the water, add the glucose and bring the liquid to a boil; let cool, add the acid and bottle.

The mucilage may be made thicker by increasing the quantity of gum arabic.

II.

Borax	6 ounces
Water	42 ounces

Glucose	5 ounces
Dextrin (yellow)	3 pounds
Oil of Cloves	20 drops
Carbolic Acid	10 drops

Dissolve the borax in the water by means of gentle heat, add the dextrin and glucose, and heat carefully with constant stirring until the dextrin is thoroughly dissolved. Add sufficient water to make up for that lost by evaporation, stir in the oil of cloves and carbolic acid and strain through a flannel cloth. Bottle at once.

This gives a low price mucilage which will be found very satisfactory in use. It remains transparent, dries quickly and is very adhesive. If too thick it may be diluted with hot water and if a thicker paste is required, this may be produced by the use of a larger quantity of dextrin.

INKS.

Few chemical preparations are in as general use as ink and the manufacture of this product is one of the most promising of the smaller industries. Very few articles in daily use by practically every man, woman and child can be produced on a commercial scale with so small an investment and at so large a percentage of profit.

The low cost of the materials entering into its composition and the lack of complicated processes in its production are the two factors which make it possible to manufacture a high grade preparation at so low a price, and the well nigh universal demand for the product makes it a comparatively easy matter to dispose of such a quantity that even though the profit on a single sale is very small, it is possible to derive a large income from the business.

The art of preparing inks seems to have been fairly well understood in the most ancient times of which we have any records and that many of the ancient inks were vastly superior to some of those produced to-day, is proven by the fact

that large numbers of manuscripts dating back into the Middle Ages are in existence and the writing on them is still perfectly legible. It is doubtful if some of the modern inks would last for as many years as these have lasted centuries.

The evanescent character of modern inks must not be ascribed entirely to the quality of the inks themselves, as the substances used in bleaching and coating papers have much to do with the fading of the inks used in writing on them. This is especially true of chloride of lime, which is largely used in paper making and may remain in the finished product to such a degree that it will prove an active agent in bleaching almost any kind of coloring matter placed on the paper. Chlorine is one of the most effective bleaching agents known to science and will destroy nearly every coloring substance, including anilin black and indigo which are "fast" to most other chemicals.

The fact that the ancient writings were made on parchment which was entirely free from any substances which could exert a deleterious effect on the ink, must be taken into consideration in comparing ancient and modern writing fluids and probably as much of the credit of permanency in these records is due to this as to the quality of the ink used in producing them.

Most of the ancient inks were similar in composition to what is now known as India or Chinese ink. This consists of finely divided carbon combined with glue in varying proportions, but the true secret of preparing these inks has never been revealed. It is asserted by some authorities that the carbon used is a fine grade of lamp-black, produced by burning gum camphor and collecting the soot by means of a funnel or inverted paper cone held over the burning substance. Be this as it may, a fairly good imitation of India ink may be produced by burning substances containing a

large proportion of carbon, as turpentine or petroleum, with as little draught as possible, collecting the soot therefrom and combining it with a clear solution of gum arabic or gelatin. This mixture is heated over a slow fire until it forms a dough like mass which may be shaped in sticks.

As the soot collected from the burning of turpentine, etc., is likely to be contaminated by fatty substances, etc., which have a tendency to interfere with its color and produce a smeary ink, it is necessary to purify it before mixing with the gum solution, if a high grade product is desired. This is accomplished by passing the smoke from the burning hydrocarbon through a long tube and collecting the soot at the extreme end of this tube. This soot is then mixed up with nitric acid and heated until the nitrous vapors cease to be given off. Dilute the mass with water, allow to settle and decant off the liquid from the carbon. Wash with several changes of water to remove all traces of the acid and then boil for ten minutes or more with a strong solution of caustic soda. Repeat the washing as before and dry the purified carbon in a covered vessel.

Most of the Chinese inks have a small quantity of musk added as a perfuming agent. If this is desired, dissolve the musk in cologne spirits and use sufficient of this solution to give the desired odor.

The principal characteristics of a good ink are intensity of color, durability, fluidity or the property of flowing readily from the pen and a reasonable degree of inalterability. Of these the first three are comparatively easy to obtain and are essential to any ink which is offered for sale. As regards inalterability (the power of resisting chemical agents), it may be stated that it is impossible to prepare an ink which is capable of resisting all such agents and still have it in such form that it is adapted for use with a pen. Printing ink possesses this quality to a marked degree, it being practically impossible to remove it from paper without destroying the

paper itself, but it is manifestly impossible to get this in a form suitable for use with a pen in ordinary writing. The inalterability of printing ink depends upon the fact that the coloring matter used (in the black ink) is finely divided carbon which resists the bleaching action of all chemical agents, and upon its power of penetrating the fibre of the paper deeply as a result of the oils used in its manufacture. India and Chinese inks will not resist a solvent which will soften and dissolve the gum with which they are mixed.

The use of some substance which will, when dissolved in the ink, impart to it sufficient density to hold the coloring matters in solution is an absolute necessity, with inks where the color depends upon the presence of a gallate or tannate of some iron salt. These compounds are not soluble in the true sense of the word, but are really insoluble matter in a finely divided state and unless some form of soluble gum is dissolved in the mixture they will in time settle to the bottom of the container, leaving the liquid nearly colorless. For this purpose gum arabic, dextrin and sugar are the substances most commonly employed. Of these the gum arabic is to be preferred as both dextrin and sugar interfere with the drying qualities of the ink and the latter also has a tendency to cause the product to ferment and become worthless.

In addition to holding the coloring matter in suspension, the gum imparts the necessary "body" to the ink to make it work properly and also gives it more or less gloss on drying. When used in excess it interferes with the free flow of the liquid from the pen and makes it difficult to produce fine lines in writing.

Another essential feature of a good ink which is not included in the list given in the preceding paragraph, is that it should not exert a corrosive action on the pens with which it is used. Such an action generally indicates that there is too large an excess of free acid in the product.

It is also important that something in the nature of a preservative be used to prevent fermentation or moulding of the ink. Unless this is done, trouble is almost certain to occur sooner or later from one or both the above causes. Of the available substances for this purpose we may mention carbolic acid, boric acid, salicylic acid, benzoate of soda, etc. Bichloride of mercury has also been recommended for the purpose, but while it would doubtless be effective, its poisonous nature furnishes a sufficient reason for declaring it unsuitable. Anilin inks seldom require the addition of any preservative, the anilins themselves, being coal tar products, acting as antiseptics and preventing either mould or fermentation.

Black inks, which are the ones in most common use, may be roughly divided into two classes, i. e., tannin inks and those produced without the aid of this substance. All of the older forms of ink, aside from the carbon varieties described above, contain tannin as an ingredient, and many of those on the market to-day depend upon the reaction between this substance and the ferric iron salts for their color.

When tannin is brought into contact with a ferric salt it will produce a color ranging from a greenish to a blue black, according to the substance from which the tannin is obtained. As a large number of vegetable substances yield tannin, it is comparatively cheap to obtain and the inks made by the combination of this substance with the salts of iron are among the best forms of this useful product.

The tannin of commerce is prepared chiefly from nut-galls. These are excrescences occurring on a certain species of oak tree growing in Syria and Asia Minor, resulting from the puncture of the bark and the deposition of an egg by an insect. In obtaining the tannin the galls are powdered and extracted with ether in an apparatus designed especially for the purpose and so constructed as to prevent the loss

of ether by evaporation. By exposing the powdered galls to a damp atmosphere for two or three days a peculiar process of fermentation occurs by means of which the tannin is converted into gallic acid. This acid is also used quite largely in the production of inks, being similar in action to tannin, so far as its effect on the ferric salts is concerned, but unlike tannic acid, it does not precipitate albumen or glue from their solution. By heating gallic acid in a closed vessel to about 410° Fahr., is sublimes and forms what is known as pyrogallic acid or pyragallol, which gives a deep blue black color with ferrous salts.

As the average manufacturer will not produce his own tannic acid or its derivative, but will obtain them through the drug trade, it will not be necessary to go farther into the process of preparing these. We will consider, therefore, the methods of producing inks containing these substances as an ingredient.

Before taking up and discussing specific formulas, it should be stated that some manufacturers make use of the crude nutgalls instead of the acids derived from them, and a considerable number of the formulas given will require the use of powdered galls in making them up. It must be kept in mind, however, that whatever effects are obtained from the use of nutgalls are due entirely to the tannin they contain.

In 1899, the State of Massachusetts adopted a standard for inks to be used on all State Records, basing their requirements upon the following formula:

Pure Dry Tannic Acid	23.4	parts	by	weight
Crystal Gallic Acid	7.7	"	"	"
Ferrous Sulphate	30	"	"	"
Gum Arabic	10	"	"	"
Diluted Hydrochloric Acid	25	"	"	"
Carbolic Acid	1	"	"	"

Water sufficient to make up the mixture at the temperature of 60° Fahr., to the volume of 1,000 parts by weight of water.

The law does not require the exact formula as given above to be followed in manufacturing the inks submitted for approval but requires that they be gallo-tanate of iron inks, not inferior in any essential quality to one properly prepared by the formula above, using ingredients of the quality described by the United States Pharmacopia.

All inks are submitted to the following tests, the comparison being made with the standard ink described above.

1. A fluid ounce allowed to stand at rest in a white glass vessel, freely exposed in diffused daylight for two weeks to the light and air, at a temperature of 50° to 60° Fahr., protected against the entrance of dust, must remain free from deposit upon the surface of the ink or on the bottom and sides of the vessel.

2. It must contain no less iron, and must have a specific gravity of 1.035 to 1.040 at 60° Fahr.

3. It must develop its color as quickly.

4. After a week's exposure to diffused daylight the color must be as an intense a black when used upon the standard record paper, and it must equally resist changes from exposure to light, air, water or alcohol.

5. It must be as fluid, flow as well, strike no more through the paper, nor remain more sticky immediately after drying.

In a letter from the Commissioner of the Public Records of the State of Massachusetts, it is stated that different amounts and kinds of coloring matter may be added to make the ink agreeable for use and darker than the ink made according to the formula given, provided they have no bad effect upon the ink itself.

The above formula and description of tests are given for two distinct purposes. The first is, that a formula that

has been accepted by so important a commonwealth as a standard of quality, after exhaustive research and experiment, must of necessity be a most valuable one, and the second is that the tests described will enable the manufacturer to compare his product with any particular ink which he may select as the standard of quality he wishes to attain by simply applying them to both his own and his competitor's product.

In making an ink from the formula given the following procedure is recommended:

Dissolve the tannic and gallic acids in 200 parts of water, adding the hydrochloric acid (Acidum Hydrochloricum Dilutum U. S. P.) to the solution. Dissolve the ferrous sulphate (copperas) in 200 parts of water, adding this solution to the one previously made. Dissolve the gum arabic in 200 parts of water and mix with the other solutions. Lastly add the carbolic acid and sufficient water to bring the finished product up to the required quantity.

The following formulas may be accepted as typical of those in which nutgalls are used in combination with iron salts:

I.

Nutgalls, in powder	6 pounds
Ferrous Sulphate	4 pounds
Gum Arabic	4 pounds
Water	15 gallons
Creosote	2 drams

A wooden cask or barrel forms the best container for this ink in the process of manufacture. Place the galls in powdered form in the barrel with sufficient water to cover them. Dissolve the ferrous sulphate and gum arabic separately. Mix the solutions and add the creosote. Now pour this mixture slowly over the nutgalls, adding the remainder of the water, stirring constantly. Cover the barrel and allow

to stand for three weeks, stirring the mixture once or twice a day. Strain through muslin and put up in bottles.

II.

Nutgalls	66 pounds
Ferrous Sulphate	22 pounds
Gum Arabic	19 pounds
Carbolic Acid	5 ounces
Water	125 gallons

Mix according to the directions given for the preceding formula.

The so-called blue black inks and writing fluids, i. e., those which appear blue when first applied to paper but soon change to deep black, are of the tanno-gallate or iron class. The change of color which occurs is due to the absorption of oxygen from the air which converts the ferrous matter into ferric salt. The compounds of the ferric salts with tannin bearing materials are of deep black color and some attempts have been made to produce an ink which would be black when first written by using the iron in the ferric instead of the ferrous form, but it has been proven that while such inks give an intense black when first used, they gradually change to a brownish color and they do not penetrate the paper to as great an extent as do those in which the ferous salts are used, making it comparatively easy to erase them by means of chemical action.

In some instances, the blue tinge of these fluids is increased by the addition of some one of the blue anilins or a solution of indigo carmine. This gives a stronger color on first using and as the iron portion is converted from the lower to a higher salt, the black color which results obscures the blue effect produced by the addition of these coloring matters.

The researches of Dr. Lewis during the early part of the nineteenth century proved conclusively that an excess of

iron in gallo- tannate ink causes them to turn brown on exposure. Dr. Clarke at later date showed that the use of gallic acid instead of tannic acid would result in a richer color in blue-black inks. Aside from this advantage, inks containing gallic acid are less susceptible to fermentative changes than those made from tannic acid.

In producing gallic acid inks, this substance is sometimes used in its pure form and in others nutgalls are used instead, the conversion of gallo-tannic to gallic acid being brought about by the decomposition referred to in a previous paragraph as producing this effect. The method of bringing about this change is as follows:

A vat is filled nearly to the top with coarsely powdered nutgalls and sufficient water is added to cover them. The vat is then covered for eight to ten days during which time a growth of mould occurs covering the entire surface of the mass. Further decomposition is prevented by the addition of boiling water and the solution of gallic acid is drawn off through a stopcock at the bottom of the vat. This is combined with the iron salt in the desired proportion and forms an ink which for color and stability is unsurpassed.

Another form of ink which was formerly quite extensively used but which has now been largely superseded by inks made from the aniline colors, has as its basis logwood or rather the coloring matter extracted from this substance. This material (logwood) contains a coloring matter known as hematoxylin, which is soluble in water and imparts to it a dark red color. By the use of acids this may be changed to a crimson red and by combining it with iron salts a very dark blue black color is produced. The use of potassium chromate with logwood solutions also gives a black color. Runge gave the following very simple formula which he claimed would produce an ink which would keep indefinitely without precipitating, adhere firmly to paper, resist the action of acids and not corrode steel pens.

Prepare a solution of logwood by boiling 22 pounds of the finely rasped wood in enough water to make fourteen gallons concoction. Allow to cool and to each 1000 parts of this solution by weight add one part of chromate of potash, adding this gradually with constant stirring. Logwood inks usually have "body" enough that the addition of gum is unnecessary. Extract of logwood may be used in the above formula, if preferred, about three and one-half pounds of the extract being equivalent to 22 pounds of the wood.

Some years ago, The Chemist and Druggist published a formula, claimed to be of Russian origin, and which produces a most excellent ink. The formula follows:

Extract of Logwood	25 drams
Lime Water	25 ounces
Hydrochloric Acid	5 drams
Bichromate of Potassium	45 grains
Carbolic Acid	45 grains
Gum Arabic	1 ounce
Distilled Water sufficient to make	2½ pints

In handling this formula it should be kept in mind that the British pint of 20 ounces is intended.

Reduce the extract to coarse powder and mix with the lime water in a basin. Heat on a water bath until the extract is dissolved, then add the acids and continue to heat for half an hour. Set aside to cool and decant the clear liquor into an earthenware jar. Add to it gradually, with constant stirring, the bichromate of potassium dissolved in ten ounces of water, then add the gum also dissolved in water and sufficient water to make up the required volume. This should be allowed to stand for several weeks before using.

This ink is red on first using but gradually changes to black. By the use of four drams of hydrochloric acid and two drams of bicromate of potassium, a violet ink will be obtained.

Many of the inks now on the market are produced from the anilin or coal tar colors. These are very simple to make but have the disadvantage of being somewhat deficient in lasting qualities. They are unsuitable to record work or other uses where the preservation of the writing for many years is desired, but for ordinary correspondence or school work answer every purpose.

These inks are made by dissolving any desired water-soluble anilin color in water in sufficient quantity to give the color desired and adding the proper amount of gum solution. The following formulas are typical:

Black Aniline Ink.

Nigrosin	¾ ounce
Gum Arabic	2½ drams
Hot Water	1½ pints
Cold Water	½ pint
Carbolic Acid	10 drops

Dissolve the nigrosin in the hot water and the gum arabic in the cold water. Mix the solutions and add the carbolic acid.

Red Ink.

Eosine	90 grains
Water	1 pint
Gum Arabic	1½ drams

Dissolve the gum arabic in four ounces of water, dissolve the eosine in the remainder of the water and mix the two solutions.

Blue Ink.

Water Blue Anilin	1½ drams
Gum Arabic	1½ drams
Hot Water	1½ pints
Cold Water	½ pint

Disolve the aniline in the hot water and the gum arabic in the cold water and mix the solutions.

Nearly everyone is familiar with the story of the Paul Brothers and their famous violet ink, by selling the secret of which they are said to have amassed a fortune of several hundred thousand dollars. This formula has been advertised and sold at prices ranging from one dollar upward by several different parties during the past ten years. The "secret" consists simply of dissolving one ounce of methyl violet anilin in two gills of hot alcohol and adding water sufficient to make a gallon. This gives a fine violet colored ink which may be improved by the addition of six drams of gum arabic to give it "body."

Althought most of the colored inks on the market are simply solutions of anilin it may prove interesting to know the formulas used in preparing these from other substances. By colored inks, I refer to all others than black.

A fine carmine ink may be made as follows:

Carmine No. 40	3 drams
Ammonia Water	1 ounce
Water	1 pint

Mix the ammonia with four ounces of water, dissolve the carmine in this mixture and add the remainder of the water. A little gum solution may be added if desired.

Fuschine (Magenta) Ink.

Fuschine	2 drams
Gum Arabic	5 drams
Alcohol	10 drams
Water	12½ ounces

Dissolve the fuschine in the alcohol by gentle heating, dissolve the gum arabic in the water and mix the solutions. A little carbolic acid or salicylic acid may be added to preserve it.

Fine Blue Ink.

Indigo Carmine	5 drams
Gum Arabic	2½ drams

Water	10	ounces
Salicylic Acid	10	grains

Dissolve the gum in the water, add the indigo carmine and stir until entirely dissolved. Then add the salicylic acid which has been dissolved in a little alcohol. More or less water may be used to give any desired color.

Copying inks are simply ordinary ink to which has been added some substance which retards its drying to such an extent that one or more copies of the writing may be taken by pressing the written sheet in a copying press with dampened copying paper. The substances usually added to inks to give them copying properties are sugar, dextrin, glucose or glycerin.

Any of the formulas for anilin inks given above will make excellent copying inks by the addition of one ounce of sugar or half an ounce of glycerin to the pint. These quantities may be varied to suit your own individual ideas of the proper qualities of an ink of this class.

By adding three or four ounces of glycerin to a pint of ink, a product will result which will admit of the taking off copies on dry paper. The writing should not be "blotted" and the copy taken as soon as posible after it is completed. The written sheet is placed in the press with the copying paper in the same manner as when making "wet" copies except that the damp cloth is not used.

Ink powders are always in demand and form an excellent article for a mail order proposition. While the ink resulting from these powders is not usually of as fine quality as that made by the other formulas given, a very good grade of ink will result from the use of the following:

Blue Black Ink Powder.

Nigrosin	1	ounce
Soluble Blue or Water Blue Anilin	2	ounces
Salicylic Acid	15	grains

Dextrin	1½ ounces

Mix all well together.

To use, dissolve in hot water. The above quantity is enough for about one to two gallons of ink according to the color desired. A very little experiment will show you how much to put in a package to make a pint or quart of ink of the desired shade.

This ink will not mould and is a very superior quality, working well with either ordinary or fountain pen.

Blue.

Water Blue Anilin	1 dram
Dextrin	5 drams

This may also be made with,

Soluble Prussian Blue	1 dram
Dextrin	2 drams

Green.

Green Anilin	1 dram
Dextrin	4 drams

Red.

Eosin	1 dram
Dextrin	1 dram

To use, dissolve in hot water.

They are usually put up in packages sufficient to make a pint of ink, which requires from a teaspoonful to a tablespoonful of the powder.

INK ERASING COMPOUNDS.

In dealing with the subject of inks, it is stated that the production of an ink which is proof against the action of all chemicals is an impossibility. Practically every coloring substance known to science can either be bleached or removed from the surface on which it is deposited and this is particularly true of these colors when used in aqueous solutions, i. e., dissolved or suspended in water, as is necessary in the case of inks to be used with a pen.

The inalterability of printer's ink and the cancelling inks used by the Postoffice Department in the cancellation of stamps does not depend so much on the nature of the coloring material as it does upon the medium in which this is suspended. In both cases, the vehicle is of an oily nature and penetrates the paper upon which it is used to a considerable depth. The coloring matter used in these inks is generally carbon, in the form of lampblack, and as stated in the discussion of Indian or Chinese inks, no chemical reagent possesses the power of bleaching this material. However, unless this is combined with an oily base, it can be quite readily washed off the surface of the paper to which it is applied, and as oily substances do not provide a suitable material for use in inks to be used with a pen, there is little opportunity of profiting by the inalterability of carbon in the production of an indellible writing ink.

Probably black anilin and the salts of vanadium come nearest to furnishing a chemical-proof ink, but the former does not bear the action of light kindly and the latter are considerably more expensive than the other materials generally employed in ink making, so that inks compounded from these materials, practically considered, are not entirely satisfactory.

Ink erasers may be divided into two distinct classes, viz: Those which remove the ink mechanically, and those which destroy its color by chemical action. Under the first head may be included such products as the ordinary erasers composed of a mixture of India rubber or some similar material with powdered pumice stone, and those powders in which pumice or some similar abrasive substance is an ingredient. With this class of products, this work has nothing to do, only those compounds which destroy the color of the ink by chemical action coming within our province.

Practically the only two bleaching materials available for this work are oxygen and chlorine, and it is to the latter that most of the commercial ink erasers owe their effectiveness. Chlorine destroys nearly all known coloring materials when brought into contact with them in the presence of moisture and those erasing compounds containing available chlorine will be found most satisfactory in use.

The iron gallo-tannate inks, i. e., those made from nutgalls combined with an iron salt, may be bleached with a solution of oxalic acid, which should be of about ten per cent. strength. This chemical turns an ink made from logwood and potassium bichromate to a violet color, one made from logwood and copper sulphate will be changed to an orange yellow; resorcinol ink will become bright red when acted upon by this acid, while anilin inks are practically unaltered by it. By reason of its different action on various coloring materials, oxalic acid is a very useful reagent in determining the nature of any particular ink whose composition we desire to know.

Chlorine is a gas of a greenish color which is readily absorbed by water, and forms with it what is known as chlorine water. The gas is generally obtained by acting upon common salt with sulphuric acid in the presence of manganese dioxide. The sulphuric acid attacks the salt (sodium chloride, NaCl.) displacing the hydrochloric acid and forming with the sodium, sodium sulphate. The liberated hydrochloric acid reacts upon the manganese dioxide, the hydrogen of the acid combining with the oxygen of the manganese salt, thus freeing the chlorine of the acid (hydrochloric acid = HC[1].) Chlorine water is a very unstable substance and, as it is evident that a fresh portion can not be conveniently prepared each time it may be needed for use, some other method of obtaining this gas must be

devised if we are to make use of it in a commercial ink erasing compound.

For this purpose, chloride of lime, sometimes called bleaching powder, is the most available source of chlorine. In order to release the combined chlorine of this salt, we must use some acid which possesses a greater affinity for the lime than does the chlorine. There are a number of acids which meet this requirement, acetic and citric being the most suitable forms for use in an erasing compound.

It will be evident that if we mix the acid with a solution of chloride of lime that the mixture will soon become useless, owing to the loss of chlorine. For this reason, the one-preparation ink erasers sometimes sold are of little value. A common formula directs the addition of acetic acid to a solution of chloride of lime and while this mixture is active enough when first made, after a few hours it loses its erasing properties and becomes worthless. It follows, therefore, that the only satisfactory method of producing an ink erasing compound will be to put up the two chemicals used in different bottles, mixing them on the paper in use.

The most satisfactory formula for an ink eraser that I have ever found is as follows:

Preparation No. 1.

Citric Acid	2 ounces
Water	1 pint

Mix and dissolve.

Preparation No. 2.

Chloride of Lime	6 ounces
Water	1 pint

Mix in a bottle provided with a closely fitting stopper, and set aside for a week, shaking frequently during this time. Decant the clear liquid for use.

Put these up in separate bottles provided with glass

stoppers. In use, the writing to be erased is moistened with solution No. 1, letting it remain on the writing for a minute or two. Now absorb any excess with a clean white blotter and apply a drop of No. 2. With most inks the bleaching effect will be instantaneous. After the writing has disappeared, apply clear water and absorb with the blotter, repeating this until all traces of the chemicals have been removed from the paper. If a yellow stain remains on the paper, it indicates that the chloride solution is too strong.

In applying the solutions do not rub the paper, but apply with a glass rod or the tip of a penholder, just touching the solution on the writing. The small perfume sample bottles, having a glass stopper with a glass rod attached extending into the bottle, will be found a very desirable container. The corks should never be mixed but always returned to the bottle from which they were taken.

All blotters used should be perfectly clean, and only white ones used, as the colored blotters sometimes stain the paper when coming in contact with the chemicals.

There is on the market, a so-called ink erasing pencil, consisting of a tightly rolled piece of blotting paper, saturated with a strong solution of citric acid. This is moistened and dabbed on the writing to be erased, and then a drop of chloride of lime solution applied. The effect is the same as when the chemicals are used in separate solutions.

So-called indellible inks, made from nitrate of silver may be bleached by the action of potassium cyanide.

SHOE POLISHES.

There is no line of specialties which has given the amateur manufacturer more trouble than have shoe polishes, and no trade secret has ever been more closely guarded than the formulas used in the production of this class of

specialties, by their possessors. Of formulas for shoe polishes there is no lack, indeed, the trade journals seem to have been competing with each other to see which could offer the greatest variety, and almost without exception these formulas have been valuable principally as examples of the extremes of ridiculousness to which people can go in attempting to explain something which they do not understand themselves.

There is but little mystery about the composition of the older forms of shoe polishes—the polish of our boyhood days—which was softened up with a generous allowance of saliva, applied with a dauber and then rubbed with the other side of the brush until it bore a close resemblance to the surface of a steam boiler, rejoicing in the recent application of a coat of asphaltum paint. The very odor of this polish proclaimed the fact that it consisted principally of a cheap grade of molasses, and the after effect of the majority of these compounds, as evidenced in bursting seams and cracked leather, told all too plainly of the rather lavish use of sulphuric acid.

In fact these polishes contained little else than cheap molasses, mixed with boneblack, reduced with sulphuric acid. Some of them were improved by the addition of an oil, generally fish oil, and vinegar appears conspicuously as an ingredient in the specifications of several patents which were taken out on this class of mixtures.

The use of sulphuric acid in these polishes may appear rather strange to some persons, but when used judiciously, it is a most excellent addition. Bone-black, consists of tri-calcium phosphate and calcium carbonate and in its crude form is not adapted to use in a shoe polish. When this material is subjected to the action of sulphuric acid, it is decomposed into calcium acid phosphate and calcium sulphate, the reaction reducing the material to extremely fine particles which may be intimately mixed with the molasses,

forming the base or vehicle of the blacking or polish. In fact, when the decomposition of the bone-black occurs after it has been mixed with the molasses, the resulting salts are intimately combined with the base and the mixture will take a much higher polish than could be obtained with the coloring material in its coarser form.

If the quantity of sulphuric acid is not in excess of that which will be neutralized by the bone-black used, it can do no possible harm, but as this is a rather cheap material, some manufacturers evidently did not take the trouble to measure it but simply dumped in what they supposed would be enough to do the work, and we must admit that it did do it in a most effective manner to the great profit of the shoe manufacturers and dealers.

The following formula is typical of all this class of polishes, and may be interesting by way of contrast with the more modern forms of this specialty:

Bone-black (Ivory-black)	4 pounds
Molasses	2 pounds
Fish Oil	1 pound
Sulphuric Acid	1 pound
Water	2 pounds

Mix the bone-black thoroughly with the oil, then combine this with the molasses, mixing until the whole forms a smooth paste. Mix the sulphuric acid with the water, adding the acid to the water slowly to avoid accidents, and stir this solution thoroughly into the mixture of bone-black, etc. The mixture will effervesce and considerable heat will be produced, and it should be allowed to stand, with occasional stirring until the action between the bone-black and the acid is complete. Then stir well and if the paste is too thick, thin out with a little vinegar.

A modified form of this blacking, approaching more nearly the modern forms of shoe polish, is made as follows:

Bone-black	10 parts
Molasses	10 parts
Sulphuric Acid	5 parts
Caustic Soda	4 parts
Fish Oil	20 parts
Water	Sufficient

Mix the bone-black with the molasses and add the acid to the mixture, allowing to stand with occasional stirring until the action between the acid and the black has ceased; dissolve the soda in a small amount of water, add the oil, and boil until a smooth soap is formed. Now add the first mixture to the second, a little at a time with constant stirring, until a smooth paste is formed, adding water if necessary to give the desired consistence.

While these formulas are interesting from a chemical standpoint, there would be little use of attempting to market a blacking made from either of them. It is with the more modern forms of polishes that we should concern ourselves —the kind that are rubbed lightly over the shoe and then polished with a soft cloth.

In attempting to guess out the secret of these up-to-date polishes, most investigators have overreached themselves and given far too complex formulas. Essentially, modern paste polishes are emulsions of wax and turpentine, with soap, colored with an anilin dye and sometimes containing a little lampblack to intensify the color.

The exact proportions of these materials very with almost every manufacturer. In order to obtain a perfect shoe polish, some experiment is always necessary and it is always advisable to make up small lots of the polish at a time until the exact method of manipulation is thoroughly understood.

The basis of most paste polishes at the present time is beeswax. Sometimes some carnauba wax is used to give hardness to the polish and my own experience convinces

me that a higher polish can be obtained where this ingredient is present. The turpentine in the polish serves to keep it soft and allow it to properly penetrate the leather while the soap gives the necessary easy rubbing qualities. Knowing these points, it is easy to modify any given formula so as to meet our particular requirements. If, for instance, the gloss obtained is not high enough, it indicates that more wax should be used; if the polish dries out too rapidly use more turpentine; if it rolls under the fingers or dauber when applying use more soap, and so on.

Some manufacturers lay considerable stress on the absence of turpentine and acid in their polishes. There is no reason why any acid should be used in any of this class of pastes, but I have found the polishes in which turpentine is used to be more generally satisfactory than the ones where it is omitted. One or two samples which have come to my attention were simply emulsions of beeswax and carnauba wax with soap and water, colored with an anilin dye, while another sample contained resin oil in place of turpentine. Some manufacturers add gum arabic to their polishes with a view to obtaining a better lustre.

Instead of using commercial soap in the production of a shoe polish, it is sometimes advantageous, especially where the work is done on a large scale, to make use of cottonseed or some similar oil with sufficient caustic soda to saponify it, thus forming the soap during the process of manufacturing the polish. In such cases, the boiling must be continued long enough to completely saponify the oil, as the presence of a free oil of any kind will have a tendency to destroy the lustre of the polish. Experiments with glycerin as an ingredient of this class of products, with a view to preventing the too rapid drying of the paste, seem to indicate that this material exerts the same action as the free oil, in the way of preventing a high polish being obtained.

The selection of an anilin color to be used in these polishes is a matter of considerable importance, as some of the anilins on the market will not stand the action of an alkali. By taking this matter up with the firms mentioned in the Sources of Supply section of the Appendix, as dealers in anilin colors, stating that you require a black anilin which will resist the action of alkalies, it will be easy to obtain the right kind of coloring material.

The following formulas have been productive of excellent results in my hands and I believe they will be found entirely suited to the needs of anyone desirous of marketing a high grade shoe polish:

I.

Beeswax	1 pound
Ceresin	1 pound
Carnauba Wax	6 ounces
Turpentine	3 pints
Yellow Soap	6 ounces
Oil-soluble Black Anilin	Enough to color
Water	Sufficient

Shave the soap and dissolve in the smallest possible quantity of water by means of heat, melt the waxes together, add the turpentine and stir well, then add the anilin dye and stir in the soap solution, continuing to stir until cold. The consistence of the paste may be varied by using more or less turpentine and water.

II.

Ozokerite	5½ ounces
Ceresin (yellow)	2 pounds
Carnauba Wax	5½ ounces
Beeswax	11 drams
Oil of Turpentine	4 pints
Lampblack	2 pounds
Oil-soluble Black Anilin	½ dram

Melt the first four ingredients, add the turpentine and stir well; then thoroughly combine the mixture with the coloring materials.

Formula No. 2 originally appeared in the Pharmaceutical Journal and yields an excellent product. Some little explanation of the nature of some of the ingredients called for, may prove interesting to those unfamiliar with them. Ozokerite, is a mineral earth wax occurring naturally in Eastern Gallacia, the Caucausus oil fields and in Persia. Deposits have also been found in Utah. It corresponds closely in composition with paraffin, but contains a larger percentage of oily matter. It sells at twenty to twenty-five cents per pound. . Ceresin, is refined ozokerite, and appears as yellow ceresin, closely resembling beeswax in appearance and white or bleached ceresin, corresponding nearly to white wax. The cost is from twenty to thirty cents per pound. Carnauba wax, is the product of a tree growing in some parts of South America and is an extremely hard substance, having a melting point of 185° Fahr., and in addition to its use in polishes is largely used in the production of candles and forms one of the ingredients of phonograph records. It sells at retail at from forty-five to sixty cents per pound. The other materials are too well known to require any explanation.

The foregoing formulas and explanation will be sufficient to enable any person of average ability to produce a satisfactory paste shoe polish. By varying the proportions of the different ingredients used, a paste of almost any desired consistence and working quality may be had. Where the turpentine is omitted, it is necessary to use a larger proportion of soap, soft or green soap sometimes being substituted for the curd (hard) soap called for in formula No. 1.

Liquid polishes are simply varnishes, consisting of various gums, etc., dissolved in some volatile solvent. A

good liquid blacking must dry quickly and not only give a high gloss but also leave an elastic or pliable surface so as not to crack or scale off or cause cracking of the leather. The material most often used as a glossing agent is shellac, but this substance is so brittle that something must be added to give it flexibility and elasticity. Copal, sandarac, resin, and various other materials also enter into the composition of these polishes. Resin is of little value on account of the extreme brittleness of this material. The use of resin oil combined with other materials in proper proportions gives a polish of good quality.

India rubber has also been utilized in the manufacture of liquid polishes, and possesses some value on account of its waterproof qualities. Tannin or tannic acid also enters into the composition of several polishes.

As a solvent, alcohol is the most suitable. For the highest grades of liquid shoe dressings, 95% pure grain alcohol is used, but in most of the cheaper products, wood alcohol is used. This does not give as good a polish and injures the leather more than grain alcohol would, however, the cost of grain alcohol is an almost insurmountable objection to its use. Gasoline, benzol, and petroleum ether have also been used as solvents but are not to be recommended.

Advantage is sometimes taken of the property of dissolving in water in the presence of an alkali, possessed by shellac, to obtain a fairly good liquid dressing at a low price. In making these the shellac is boiled in water to which has been added ammonia, borax or soda in sufficient quantities to dissolve the gum. The coloring matter is then added, together with a little glycerin or oil to give flexibility and any desired perfuming material.

Turpentine and resin oil seem to hold first place in the line of materials for imparting elasticity and flexibility to the alcoholic solutions of shellac. The latter is probably better than the former, but a polish containing resin oil will

not dry as quickly as one in which turpentine is used. Sometimes drying oils as linseed and castor are used.

In preparing liquid polishes, it should be kept in mind that the thinner the liquid, so long as it possesses the requisite coloring and covering power, the better, as the use of a heavy varnish is almost certain to crack the leather. Some of the polishes on the market, which give the appearance of patent leather on any surface to which they are applied cannot be too strongly condemned. Their use is ruinous to the leather and unless the shoes are carefully washed in wood alcohol to remove the old coating each time the liquid is applied, two or three applications will give a rough, crackly looking surface which is anything but attractive.

The following typical formulas illustrate the methods of preparing these polishes and the proportions of the different ingredients may be varied within any reasonable limits to meet particular conditions or requirements.

I.

Shellac	1 pound
Ammonia (16 deg.)	8 ounces
Water	40 ounces
Glycerin	2 ounces
Anilin Black enough to give the desired depth of color	

Boil the shellac with the water and ammonia until it is dissolved, adding a little more ammonia if necessary to complete the solution. Remove from the fire, dissolve the color in the liquid and mix with the glycerin.

Then add water enough to make two gallons. If wanted thicker, use more shellac.

II.

Shellac	8 ounces
Alcohol	28 ounces

Yellow Laundry Soap	2½ ounces
Glycerin	½ ounce
Analin Black (spirit soluble)	½ ounce
Water	6 ounces

Dissolve the shellac in one pint of alcohol; shave the soap and dissolve in a mixture of the water and two ounces of alcohol by means of heat; dissolve the anilin black in the remainder of the alcohol; mix these two solutions and add the glycerin. Mix well, letting stand for several days before bottling.

III.

Alcohol	50 parts
Shellac	7 parts
Turpentine	2 parts
Black Anilin (spirit soluble)	1 part

Dissolve the shellac and the anilin in separate portions of alcohol, mix and add the turpentine in small portions, shaking or stirring well after each addition.

IV.

Alcohol	50 parts
Shellac	9 parts
Sandarac	1½ parts
Turpentine	1 part
Black Anilin (spirit soluble)	1½ parts

Dissolve the shellac and sandarac in alcohol; dissolve the color in another portion of the alcohol, mix these solutions and add the turpentine. The addition of a small quantity of castor oil to the above formula (about 10 to 15 drops to each pint) will be found an improvement. This should be mixed with the solution of shellac, etc., before adding the coloring solution.

For other colors than black, bleached shellac is substituted for the orange shellac used in black polishes, and the desired anilin color added. In making russet and tan paste

polishes, the base is the same as in making the black, the only difference being in the color used. The anilins offer variety enough to meet all requirements in the way of coloring matters.

White Shoe Dressing.

The popularity of white canvass shoes has necessitated the production of some dressing which will clean them when soiled and keep them white. Various formulas have been offered, from time to time, for this purpose, but I have found the following the most satisfactory:

Bleached Shellac	8	ounces
Borax	1½	pounds
Hot Water	1	gallon

Dissolve the borax in the water and boil the shellac in the solution until it is entirely dissolved. Strain and add pipe clay or fine prepared chalk until a creamy liquid is obtained. The clay or chalk should be in the finest possible powder.

For other colors than white, dissolve the proper colored anilin in a little alcohol and add to the mixture. For example, a grey or drab color may be had by using a little black anilin with the white dressing, a brown with bismark brown or a mixture of red and black, etc.

In use, the shoes are first dried thoroughly and all mud, etc., removed with a stiff brush. Then one or more coats of the dressing are applied with a sponge and allowed to dry. Before using, the shoes are brushed with a clean dry brush.

FIRE EXTINGUISHERS.

The most popular form of Fire Extinguisher at present, is a tube filled with a powder, which is to be thrown on the fire to be extinguished. The principle on which these depend is the use of a powder which when heated evolves carbonic acid in sufficient quantity that when it settles

around the base of the flame by virtue of its high specific gravity, it shuts off the supply of oxygen, thus extinguishing the fire.

Numerous formulas have been given from time to time for such powders, but as we come to compare these with the results of analysis of the commercial powder extinguishers on the market, we cannot help noting the wide discrepancy between the published formulas and the composition of the powders now being sold. Many of the published formulas call for the use of such materials as chloride of lime and salt, which are entirely unsuited for this use, on account of their tendency to absorb moisture from the atmosphere and become caked or hardened in the tube to such an extent that they become useless.

Most of the commercial forms of powder extinguishers, contain nothing else than bicarbonate of soda, colored with ochre or some similar material to disguise their real composition. Probably nothing better than this material could be found and its cheapness together with the ease with which it may be obtained make it the most suitable substance for the purpose.

Analyses of a dozen of the most widely known extinguishing powders proves that they consist essentially of bicarbonate of soda mixed with iron ore (ochre) in proportions of from 81.2% to 97.5% of the sodium salt to 19.8% to 2.5% of red or yellow ochre. One sample contained a little common salt, while another had about two per cent. of carbonate of ammonia and eight per cent. of phosphate of soda, neither of which can be considered as an improvement. In a few of the powders some mineral substance as barytes, was added, evidently with a view to overcoming any tendency to harden in the tubes.

In making these extinguishers, the materials should be air-dried, not calcined, and put up in the tubes without packing too closely. If the materials are calcined, much of

the water present is driven off and the powders will absorb moisture from the air very readily.

Directions for use, are to throw the powder into the base of the flame as violently as possible. The hotter the fire, the quicker the carbonic acid gas will be released and its effects produced.

SWEEPING COMPOUNDS.

These are designed to be used on floors in sweeping for the purpose of preventing the dust from rising. Most of those now on the market consist of sawdust, saturated with paraffin oil and mixed with sand or Portland cement to give it the necessary weight. Some of them contain an antiseptic ingredient, generally oil of eucalyptus. When colored, this is done by dissolving some oil-soluble anilin in the paraffin oil before mixing with the sawdust.

The proportions of the different materials may be varied to suit any particular purpose for which the compound is intended, it being self evident that for use on carpets, much less oil should be used than where the compound is intended for use on wood floors.

A general formula which may be varied to suit, is as follows:

Dry Sawdust	10 pounds
Paraffin Oil	2 quarts
Paraffin Wax	2 ounces
Coarse Salt	½ pound
Oil Eucalyptus	2 ounces
Sea Sand	4 pounds
Anilin color	Sufficient

Warm the oil and mix it with the melted wax, dissolve the anilin color in the mixture, add the oil of ecalyptus and saturate the sawdust with the mixture. Then mix this thoroughly with the salt and sand.

This gives the compound for rough wood floors. For use on polished floors and carpets the oil may be reduced to one quart or even a pint, to the above quantities of the other materials.

WOOD DYES AND STAINS.

The so-called varnish stains now on the market consist, for the most part, of a good quality of varnish to which has been added sufficient oil soluble anilin to give the desired color. Anilins suitable for this purpose may be had from any of the large dealers in this class of materials and a little experience in blending these will enable anyone to produce a wide variety of colors.

Exact formulas for the imitation of the different kinds of wood would require more space than can be devoted to the subject, therefore, it must suffice to say that the different red shades are used for cherry and mahogany, browns for walnut, and mixtures of brown and yellow for oak. For the darker colors, either more of the coloring material is used, or else the deep browns and blacks are judiciously combined with the other colors used. In using these colors, they should be dissolved in the smallest possible quantity of turpentine, and strained. Then add to the varnish, mixing well.

A wide variety of wood dyes may be made by dissolving the different colored anilins in gasoline. If desired, a small quantity of stearin or paraffin may also be dissolved in the gasoline to give it body. These are used by applying with a soft flat brush to the wood, allowing to dry and then varnishing.

The ordinary water soluble anilins also make fairly good wood dyes by dissolving in hot water and diluting until the desired shade is obtained. After applying to the wood, it is allowed to dry and then varnished. In cases where an extremely high finish is desired, the first coat of varnish

is rubbed down with pumice stone and a second coat applied. The so-called hard oil finish is excellent for use over these dyes.

A fine imitation of walnut on soft woods may be obtained by using a hot solution of permanganate of potash in water. This liquid is a bright purple color, but when applied to wood, it soon forms a hydrated manganese oxide, of a deep brown color.

For an ebony stain on wood, use the following:

Tannin	4 ounces
Sulphate of Iron	5 ounces
Logwood Chips	8 ounces
Boiling Water	2 pints

Infuse until the color is extracted from the chips, and apply hot to the wood. Several applications will generally be required to give the desired dead black color.

Two or three ounces of logwood extract may be used instead of the logwood chips, if preferred.

Small wooden articles, boiled in this liquid and then given a coat of some good oil, as linseed, give an almost perfect imitation of genuine ebony. I have a set of violin pegs made from maple and colored in this manner, which have been used for several years without showing any change of color.

For the Mission Stain, now used so largely, nothing is better than asphaltum varnish thinned out with turpentine or gasoline, and applied with a brush or soft cloth.

SECTION IX

THE CARE OF RAW MATERIALS, AND FINISHED PRODUCTS.

The proper preservation of the various raw materials entering into the composition of your products and of these products when finished is a matter of the utmost importance. One of the greatest sources of loss in any manufacturing industry is the deterioration of raw materials and finished products and lack of attention to those points is sure to result in much loss of profit from the added expense of raw materials and the loss of what would otherwise have been a marketable product. Aside from this, raw materials which have deteriorated in value and will not work well in any formula, and many times a formula is condemned as worthless when the real source of the trouble lies in the use of ingredients, which have been allowed to deteriorate.

Care should be taken to purchase only raw materials of the highest possible quality. As the average mixer is not in a position to test the quality of the materials he purchases, his greatest safeguard lies in buying only from firms of known integrity and established reputation. Should you, through any accident, obtain a lot of chemicals which are not up to the required standard of quality from such a firm, they will be only too glad to replace them with fresh goods.

The stronger acids (sulphuric, nitric and hydrochloric) should always be kept in glass stoppered bottles and handled with the greatest caution. A drop of any of these falling on

the hands is sure to cause a painful burn and should it fall upon the clothing, a hole is the inevitable result unless it is promptly neutralized by some alkali, such as ammonia. For this reason, a bottle of ammonia water should always be kept within easy reach when handling any of these acids. Especial care must be taken to prevent exposure of sulphuric acid to the air, as it will absorb sufficient moisture from the atmosphere to become much weakened in strength. Use is made of this peculiar hygroscopic property of this acid in drying gases by passing them over or through vessels of this acid.

For most other materials ordinary cork stoppers are suitable. These should be of good quality and of such size that they project sufficiently above the mouth of the bottle to admit of easy extraction. A cork which has been removed with any instrument as a knife or corkscrew, is likely to be rendered porous by this and cause the loss of the contents of the bottle which it is designed to protect. Have plenty of good quality corks of the various sizes which you are likely to use, at hand, and whenever a cork becomes in any way damaged, replace it with a new one. It is poor economy to allow a dollar's worth of raw material to be spoiled to save a cork, which at the most, would cost only a small fraction of a cent, except in the extremely large sizes.

Deliquescent salts such as carbonate of potassium, chloride of lime, etc., should always be kept in closely stoppered bottles or cans with air tight covers. It is advisable to keep these in small containers, as the air which would occupy the portion of a large container from which the materials have been used is sufficient to materially injure the quality of such chemicals. Chloride of zinc and the caustic alkalies, soda and potash, are other materials to which this also applies.

Essential oils should always be stored in small bottles, with the corks securely sealed by dipping in melted paraffin.

If you buy in pound bottles, it is always advisable as soon as one is opened to fill the contents into bottles of two to four ounces capacity, sealing as directed above. This will insure their always being fresh when wanted for use.

Some persons advise the addition of about four ounces of alcohol to each pound of oil as soon as opened. This is claimed to keep it from oxydizing by the action of the air but it is much safer to use the small bottles for any portions of a bottle which may be opened and not immediately used.

Powdered herbs, barks, roots, etc., are best kept in tightly covered tin cans or boxes, although they may be kept in paper bags, if kept in a dry place. Where several kinds of materials are stored in one box or drawer, care should be taken that they are not of such a nature that one drug will absorb the odor of some other one. Certain materials very readily absorb odors with which they come in contact and it is easy to spoil several dollars' worth of materials by carelessness in this respect.

Where several different kinds of materials are kept in a single box or drawer, it will be found a great convenience to place a card in the front of the drawer with a list of the contents written on it. The same purpose may be served by pasting a label with a list of contents on the front of the drawer.

Finished products, should never be stored in a damp place. When packed in paper packages they will absorb moisture and even if in bottles, the labels will become mildewed and ruined in the experience.

The best method of storing finished products is to place them on shelves in a dry room where the temperature will not rise above 60° Fahr. If the room can be darkened, so much the better.

Special suggestions as to handling are given with several of the formulas throughout this work and those just mentioned will cover most questions which are likely to arise in connection with this matter.

SECTION X

HOME MADE APPARATUS.

The equipment of a laboratory for manufacturing purposes is one of the subjects which always interests the would-be manufacturer. There is practically no limit to the amount of money which may be invested in the equipment of a laboratory, but on the other hand, quite an extensive business may be done in many lines with but very little equipment. If the mixer is "handy with tools" or can command the services of someone who is, a large part of the necessary equipment for many lines of work may be devised extemporaneously. I trust that the following suggestions will aid many beginners in this line of work to provide themselves with the necessary equipment at a very reasonable cost.

For manufacturing purposes, some kind of a room is necessary. It should have fairly good light and if possible be provided with running water. This is not an absolute necessity but is a great convenience.

The room need not necessarily be large, and in cases where a room is not available for the purpose a corner of a room used for something else may be separated from the rest of the room by a wooden screen or partition or even a curtain. Some means of obtaining heat is necessary and the kitchen range may be used for this or in case you don't happen to have this useful piece of furniture a small gaso-

line or alcohol burner will answer every purpose. If your room is provided with gas, one of the small gas stoves or hot plates is advisable, connecting it to the light jet by means of flexible tubing.

On one side of the room shelving should be arranged. For this use one inch stuff, making the shelves of any convenient length and of various distances apart to accommodate bottles of different sizes. These shelves may be easily put up by cutting two strips of the proper length for the ends and fastening cleats on these to support the shelves and then putting one or two slim nails or screws in the end of each shelf to hold the set securely together. Eight inches is deep enough for these shelves, and they may be even narrower if necessary.

For a table I would suggest a stout kitchen table which may be had for about $1.50 to $2.00. These are equipped with two drawers and measure 2¼x4 feet in size. Then get a pine board ten inches wide and twelve feet long. Cut two pieces four feet long and two feet long. Nail or screw the short pieces on the ends of the table twelve inches from the back edge, letting them extend upward above the table. Then nail the longer pieces inside these so as to form two shelves running the entire length of the table. The first shelf should be fourteen inches above the table top and the second one flush with the ends of the short upright strips.

Before putting the lower shelf in place, bore five one inch holes in the board nine inches apart and five inches from the front edge. These are for the purpose of holding funnels for filtering purposes, the receivers being placed on the table below the shelf. With this arrangement one can carry on filtering quite rapidly as five different liquids can be filtered at the same time or the entire lot of funnels may be used for different portions of the same liquid. Where more filtering room is needed cut some strips of one inch stuff three inches

wide and fifteen inches long. Fasten these to the under side of the lower shelf with ordinary carriage bolts so that they will swing back under the shelf when not in use. The bolt should be put in five inches from the end and a one inch hole bored in each end of the stick. Three of these placed under the shelf will make it possible to use eight filters at once.

It is advisable to make one of these pieces lighter than the other and bore a half inch hole in it instead of the one inch hole. This is for holding a small funnel where only a small quantity of a substance is to be filtered.

Buy a sufficient number of six inch funnels to fill the holes provided and a package of filter paper of the proper size to fit these funnels when folded. This may be stored in the drawer of the table and the funnels may be stacked one inside the other and kept under the table when not in use.

Such a table gives facilities for mixing and putting up the goods as the labels, etc., used may be kept in one of the drawers and there is plenty of room for bottling, labeling, etc., on the table. The top shelf of the table is useful for either materials in frequent use or for the finished products, while large bottles, jugs, etc., holding such materials as are purchased in quantities may be stored under the table.

The arrangement of the shelves as described is to be used whenever it is possible to have the table in the center of the room as this admits working from both sides. Where it has to be pushed back against the wall on account of lack of room the shelves should be at one side of the table instead of in the center as described.

Several pieces of rubber tubing one-fourth inch in diameter and three feet long fitted with a stop cock similar to that used on fountain syringe tubes should be provided. These are used for bottling purposes, placing the container on the top shelf and inserting the tube, forming a siphon. The flow of liquid may be started through the tube by exhausting the air with the mouth, or the tube may be filled

with the liquid by means of a small funnel, when the liquid will flow continuously until shut off or until the contents of the container are exhausted. Whenever it is necessary to shut off the flow of liquid, simply close the stop cock. This method of bottling avoids the spilling of liquids or the necessity of using a funnel in filling the bottles. Where a gallon or more of a liquid is to be bottled, this arrangement will be found a great convenience. The rubber tubing should be thoroughly cleansed after using and for each distinct class of preparations a separate tube should be used, i. e., the same tube might be used for bay rum, hair tonics, etc., but should not be used for flavoring extracts.

As stated elsewhere, the use of a narrow mouth pitcher affords a convenient method of pouring many preparations into bottles.

For the manufacture of such products as are put up in lozenge form, as well as for the making of many forms of tablets, a convenient piece of apparatus consists of a smooth hardwood board, about 18 inches wide and provided with strong strips of wood along each side, of such a height as to permit the rolling pin which is used with it to touch the bottom, when the board is empty. For gauging the thickness of tablets, strips of wood similar to printer's "furniture" are laid along the sides, close to the border strips. If it is desired to make tablets or lozenges, one-fourth inch in thickness, these strips of wood may be one-half inch wide and one-fourth inch thick. The mass is placed on the board and rolled out with the rolling pin, the inside strips insuring its being of the exact thickness desired. For cutting the tablets, use a small funnel, made of tin and having the smaller end of the exact size of the tablets desired. By this method the tablets may be cut out very rapidly. The board should be of maple or walnut and securely put together with screws to prevent warping. Two strips fastened crosswise across

the bottom of the "machine" will be found effective in preventing the bottom from warping.

For the above description, I am indebted to Dr. F. W. McCannon of Des Moines, Iowa.

As a moistener for gummed labels, I have found the following, which was described by a writer in The Druggist's Circular some time ago, very effective:

Take a flat tin box, either square or oblong in shape, and of any convenient size, and cut two notches in the ends. Make a wooden roller which will just fit the box in length, drive a nail in each end and place it inside the box. Fill the box about one-third full of water, and when it is desired to moisten a label, simply place the gummed side on the cylinder and revolve it so as to bring the wet surface in contact with the label.

Your own ingenuity will suggest hundreds of other simple devices which will save time and be extremely convenient. A few dollars expended in the production of simple apparatus of this kind will be found money wisely spent.

SIGNS COMMONLY USED IN PRESCRIPTION WRITING.

Sign	Meaning.
A or a. a.	Of each
Ad.	To or up to
Ad. lib.	At pleasure, or as much as desired
Aq. bull.	Boiling water
Aq. dest.	Distilled water
Aut.	Or
Bis. in d.	Twice a day
Cong.	A gallon
Cort.	Bark
Cum or c.	With
Dil.	Dilute
D. in p. aq.	Divide into equal parts

Et.	And
Ext. or Extr.	Extract
Fiat.	Make
Gtt.	Drop or drops
Liq.	A solution
Infus.	An infusion
M.	Mix
Non.	Not
No.	Number
O.	A pint
P. a. e.	Equal parts
q. s.	A sufficient quantity
℞	Take
s. s.	A half
Sig.	Mark thou, or write upon
t. i. d.	Three times a day
Tinct.	Tincture
℈	Scruple or scruples
ʒ	Dram or drams
℥	Ounce or ounces
lb	Pound or pounds

APPENDIX.

Every manufacturer of food and drug products coming within the jurisdiction of the Food and Drugs Act of June 30, 1906, should thoroughly familiarize himself with the requirements and provisions of this law. In order to make this volume of the greatest possible service to the manufacturer, the full text of this law with many of the regulations for the enforcement of the same are herewith reprinted from originals furnished by the Bureau of Food and Drug Inspection of the United States Department of Agriculture at Washington, D. C.

RULES AND REGULATIONS FOR THE ENFORCEMENT OF THE FOOD AND DRUGS ACT.

INTRODUCTION.

(Including Regulations 3, 17, 19, and 34 as amended by F. I. D. 79, 84, and 93, issued October 16, 1907, February 10, 1908, and May 23, 1908, respectively.)

Under date of October 17, 1906, forty rules and regulations for the enforcement of the Food and Drugs Act, June 30, 1906, were adopted. Since that date four regulations, Nos. 3, 17, 19, and 34 have been amended, the first named by F. I. D. 79 "Collection of Samples," approved by Secretary Wilson of the Department of Agriculture, Secretary Cortelyou of the Treasury, and Secretary Straus of Commerce and Labor, and the other three by F. I. D. 84, "Label" and "Character of Name," and F. I. D. 93, "Denaturing," over the same signatures.

Regulation 2, Original Unbroken Packages, has been further interpreted by F. I. D. 86, and Regulation 9, Form of Guaranty, by F. I. D. 83, the latter an opinion rendered by the Attorney-General on the issue of a guaranty based upon a guaranty.

In accordance with Regulation 15, Wholesomeness of Colors in Preservatives; F. I. D. 76, on Dyes, Chemicals and

Preservatives in Foods; and F. I. D. 89, Relating to the Use in Foods of Benzoate of Soda and Sulphur Dioxide, have been issued over the signatures of the three Secretaries, constituting tentative decisions on these points pending the completion of investigations and the issuance of final regulations governing the use of these substances.

With the exception of these amendments and amplifications the regulations as originally issued remain unchanged, and no additional rules have been adopted, the revision issued under this date merely incorporating the changes enumerated.

JAMES WILSON.
Secretary of Agriculture.

WASHINGTON, D. C., May 14, 1908.

RULES AND REGULATIONS.

GENERAL.

Regulation 1. Short Title of the Act.

The act, "For preventing the manufacture, sale, or transportation of adulterated or misbranded or poisonous or deleterious foods, drugs, medicines, and liquors, and for regulating traffic therein, and for other purposes," approved June 30, 1906, shall be known and referred to as "The Food and Drugs Act, June 30, 1906."

Regulation 2. Original Unbroken Package.

[See also F. I. D. 86 for interpretation of this regulation.]

(Section 2.)

The term "original unbroken package" as used in this act is the original package, carton, case, can, box, barrel, bottle, phial, or other receptacle put up by the manufacturer, to which the label is attached, or which may be suitable for the attachment of a label, making one complete package of the food or drug article. The original package contemplated includes both the wholesale and the retail package.

Regulation 3. Collection of Samples.

[As amended by F. I. D. 79, October 8, 1907, to take effect November 1, 1907.]

(Section 4.)

Samples of unbroken packages shall be collected only by authorized agents of the Department of Agriculture, or by the health, food or drug officer of any State, Territory, or the District of Columbia, when commissioned by the Secretary of Agriculture for this purpose.

Samples may be purchased in the open market, and, if in bulk, the marks, brands or tags upon the package, carton, container, wrapper or accompanying printed or written matter shall be noted. The collector shall also note the names of the vendor and agent through whom the sale was actually made together with the date of the purchase. The collectors shall purchase representative samples.

A sample taken from bulk goods shall be divided into three parts, and each shall be labelled with the identifying marks.

If a package be less than four pounds, or in volume less than two quarts, three packages shall be purchased, when practicable, and the marks and tags upon each noted as above. When three samples are purchased, one sample shall be delivered to the Bureau of Chemistry or to such chemist or examiner as may be designated by the Secretary of Agriculture; the second and third samples shall be held under seal by the Secretary of Agriculture, who, upon request, shall deliver one of such samples to the party from whom purchased or to the party guaranteeing such merchandise.

When it is impracticable to collect three samples, or to divide the sample or samples, the order of delivery outlined above shall obtain, and in case there is a second sample the Secretary of Agriculture may, at his discretion, deliver such sample to parties interested.

All samples shall be sealed by the collector with a seal provided for the purpose.

Regulation 4. Methods of Analysis.

(Section 4.)

Unless otherwise directed by the Secretary of Agriculture, the methods of analysis employed shall be those prescribed by the Association of Official Agricultural Chemists and the United States Pharmacopœia.

Regulation 5. Hearings.

(Section 4.)

(a) When the examination or analysis shows that the provisions of the foods and drugs act, June 30, 1906, have been violated, notice of that fact, together with a copy of the findings, shall be furnished to the party or parties from whom the sample was obtained or who executed the guar-

anty as provided in the food and drugs act, June 30, 1906, and a date shall be fixed at which such party or parties may be heard before the Secretary of Agriculture, or such other official connected with the food and drug inspection service as may be commissioned by him for that purpose. The hearings shall be had at a place to be designated by the Secretary of Agriculture, most convenient for all parties concerned. These hearings shall be private and confined to questions of fact. The parties interested therein may appear in person or by attorney and may propound proper interrogatories and submit oral or written evidence to show any fault or error in the findings of the analyst or examiner. The Secretary of Agriculture may order a re-examination of the sample or have new samples drawn for further examination.

(b) If the examination or analysis be found correct the Secretary of Agriculture shall give notice to the United States District Attorney as prescribed.

(c) Any health, food or drug officer or agent of any State, Territory, or the District of Columbia who shall obtain satisfactory evidence of any violation of the food and drugs act, June 30, 1906, as provided in section 5 thereof, shall first submit the same to the Secretary of Agriculture, in order that the latter may cause notice to be given to the guarantor or to the party from whom the sample was obtained.

Regulation 6. Publication.

(Section 4.)

(a) When a judgment of the court shall have been rendered there may be a publication of the findings of the examiner or analyst, together with the findings of the court.

(b) This publication may be made in the form of circulars, notices, or bulletins, as the Secretary of Agriculture may direct, not less than thirty days after the judgment.

(c) If an appeal be taken from the judgment of the court before such publication, notice of the appeal shall accompany the publication.

Regulation 7. Standards for Drugs.

(Section 7.)

(a) A drug bearing a name recognized in the United States Pharmacopœia or National Formulary, without any

further statement respecting its character,, shall be required to conform in strength, quality, and purity to the standards prescribed or indicated for a drug of the same name recognized in the United States Pharmacapœia or National Formulary, official at the time.

(b) A drug bearing a name recognized in the United States Pharmacopœia or National Formulary, and branded to show a different standard of strength, quality, or purity, shall not be regarded as adulterated if it conforms to its declared standard.

Regulation 8. Formulas—Proprietary Foods.

(Section 8, last paragraph.)

(a) Manufacturers of proprietary foods are only required to state upon the label the names and percentages of the materials used, in so far as the Secretary of Agriculture may find this to be necessary to secure freedom from adulteration and misbranding.

(b) The factories in which proprietary foods are made shall be open at all reasonable times to the inspection provided for in Regulation 16.

Regulation 9. Form of Guaranty.

[See also F. I. D. 83 for opinion of the Attorney-General on the issue of a guaranty based upon a former guaranty.]

(Section .9)

(a) No dealer in food or drug products will be liable to prosecution if he can establish that the goods were sold under a guaranty by the wholesaler, manufacturer, jobber, dealer, or other party residing in the United States from whom purchased.

(b) A general guaranty may be filed with the Secretary of Agriculture by the manufacturer or dealer and be given a serial number, which number shall appear on each and every package of goods sold under such guaranty with the words "Guaranteed under the food and drugs act, June 30, 1906.

(c) The following form of guaranty is suggested:

I (we) the undersigned do hereby guarantee that the articles of foods or drugs manufactured, packed, distributed, or sold by me (us) [specifying the same as fully as possi-

ble] are not adulterated or misbranded within the meaning of the food and drugs act, June 30, 1906.

(Signed in ink.)

____ ____.

[Name and place of business of wholesaler, dealer, manufacturer, jobber, or other party.]

(d) If the guaranty be not filed with the Secretary of Agriculture as above, it should identify and be attached to the bill of sale, invoice, bill of lading, or other schedule giving the names and quantities of the articles sold.

ADULTERATION.

Regulation 10. Confectionery.

(Section 7.)

(a) Mineral substances of all kinds (except as provided in Regulation 15) are specifically forbidden in confectionery whether they be poisonous or not.

(b) Only harmless colors or flavors shall be added to confectionery.

(c) The term "narcotic drugs" includes all the drugs mentioned in section 8, food and drugs act, June 30, 1906, relating to foods, their derivatives and preparations, and all other drugs of a narcotic nature.

Regulation 11. Substances Mixed and Packed with Foods.

(Section 7, under "Foods.")

No substance may be mixed or packed with a food product which will reduce or lower its quality or strength. Not excluded under this provision are substances properly used in the preparation of food products for clarification or refining, and eliminated in the further process of manufacture.

Regulation 12. Coloring, Powdering, Coating, and Staining.

(Section 7, under "Foods.")

(a) Only harmless colors may be used in food products.

(b) The reduction of a substance to a powder to conceal inferiority in character is prohibited.

(c) The term "powdered" means the application of any powdered substance to the exterior portion of articles of food, or the reduction of a substance to a powder.

(d) The term "coated" means the application of any substance to the exterior portion of a food product.

(e) The term "stain" includes any change produced by the addition of any substance to the exterior portion of foods which in any way alters their natural tint.

Regulation 13. Natural Poisonous or Deleterious Ingredients.

(Section 7, paragraph 5, under "Foods.")

Any food product which contains naturally a poisonous or deleterious ingredient does not come within the provisions of the food and drugs act, June 30, 1906, except when the presence of such ingredient is due to filth, putrescence, or decomposition.

Regulation 14. External Application of Preservatives.

(Section 7, paragraph 5, under "Foods," proviso.)

(a) Poisonous or deleterious preservatives shall only be applied externally, and they and the food products shall be of a character which shall not permit the permeation of any of the preservative to the interior, or any portion of the interior, of the product.

(b) When these products are ready for consumption, if any portion of the added preservative shall have penetrated the food product, then the proviso of section 7, paragraph 5, under "Foods," shall not obtain, and such food products shall then be subject to the regulations for food products in general.

(c) The preservative applied must be of such a character that, until removed, the food products are inedible.

Regulation 15. Wholesomeness of Colors and Preservatives.

[See also F. I. D. 76 and 89 for rulings under this head pending complete investigations and final decision.]

(Section 7, paragraph 5, under "Foods.")

(a) Respecting the wholesomeness of colors, preservatives, and other substances which are added to foods, the Secretary of Agriculture shall determine from chemical or other examination, under the authority of the agricultural appropriation act, Public 382, approved June 30, 1906, the names of those substances which are permitted or inhibited in food products; and such findings, when approved by the Secretary of the Treasury and the Secretary of Commerce and Labor, shall become a part of these regulations.

(b) The Secretary of Agriculture shall determine from time to time, in accordance with the authority conferred by the agricultural appropriation act, Public 382, approved June 30, 1906, the principles which shall guide the use of colors, preservatives, and other substances added to foods; and when concurred in by the Secretary of the Treasury and the Secretary of Commerce and Labor, the principles so established shall become a part of these regulations.

Regulation 16. Character of the Raw Materials.

(Section 7, paragraph 1, under "Drugs;" paragraph 6, under "Foods.")

(a) The Secretary of Agriculture, when he deems it necessary, shall examine the raw materials used in the manufacture of food and drug products, and determine whether any filthy, decomposed, or putrid substance is used in their preparation.

(b) The Secretary of Agriculture shall make such inspections as often as he may deem necessary.

MISBRANDING.

Regulation 17. Label.

[As amended by F. I. D. 84, January 31, 1908, taking effect February 10, 1908.]

(Section 8.)

(a) The term "label" applies to any printed, pictorial, or other matter upon or attached to any package of a food or drug product, or any container thereof subject to the provisions of this act.

(b) The principal label shall consist, first, of all information which the food and drugs act, June 30, 1906, specifically requires, to wit, the name of the place of manufacture in the case of food compounds or mixtures sold under a distinctive name; statements which show that the articles are compounds, mixtures or blends; the words "compound," "mixture," or "blend," and words designating the substances or their derivatives and proportions required to be named in the case of foods and drugs. All this information shall appear upon the principal label, and should have no intervening or descriptive or explanatory reading matter. Second, if the name of the manufacturer and place of manufacture are given, they should also appear upon the principal label. Third, preferably upon the principal label, in con-

junction with the name of the substance, such phrases as "artificially colored," "colored with sulphate of copper," or any other descriptive phrases necessary to be announced should be conspicuously displayed. Fourth, elsewhere upon the principal label other matter may appear in the discretion of the manufacturer. If the contents are stated in terms of weight or measure, such statement should appear upon the principal label and must be couched in plain terms, as required by Regulation 29.

(c) If the principal label is in a foreign language, all information required by law and such other information as indicated above in (b) shall appear upon it in English. Besides the principal label in the language of the country of production, there may be also one or more other labels, if desired, in other languages, but none of them more prominent than the principal label, and these other labels must bear the information required by law, but not necessarily in English. The size of the type used to declare the information required by the act shall not be smaller than 8-point (brevier) capitals: *Provided,* That in case the size of the package will not permit the use of 8-point type, the size of the type may be reduced proportionately.

(b) Descriptive matter upon the label shall be free from any statement, design, or device regarding the article or the ingredients or substances contained therein, or quality thereof, or place of origin, which is false or misleading in any particular. The term "design" or "device" applies to pictorial matter of every description, and to abbreviations, characters or signs for weights, measures, or names of substances.

(e) An article containing more than one food product or active medicinal agent is misbranded if named after a single constituent.

In the case of drugs the nomenclature employed by the United States Pharmacopœia and the National Formulary shall obtain.

(f) The use of any false or misleading statement, design, or device appearing on any part of the label shall not be justified by any statement given as the opinion of an expert or other person, nor by any descriptive matter explaining the use of the false or misleading statement given as the opinion of an expert or other person, nor by any de-

scriptive matter explaining the use of the false or misleading statement, design or device.

Regulation 18. Name and Address of Manufacturer.

(Section 8.)

(a) The name of the manufacturer or producer, or the place where manufactured, except in case of mixtures and compounds having a distinctive name, need not be given upon the label, but if given, must be the true name and the true place. The words "packed for ———," "distributed by ———," or some equivalent phrase, shall be added to the label in case the name which appears upon the label is not that of the actual manufacturer or producer, or the name of the place not the actual place of manufacture or production.

(b) When a person, firm, or corporation actually manufactures or produces an article of food or drug in two or more places, the actual place of manufacture or production of each particular package need not be stated on the label except when in the opinion of the Secretary of Agriculture the mention of any such place, to the exclusion of the others, misleads the public.

Regulation 19. Character of Name.

[As amended by F. I. D. 84, January 31, 1908, taking effect February 10, 1908.]

(Section 8.)

(a) A simple or unmixed food or drug product not bearing a distinctive name should be designated by its common name in the English language; or if a drug, by any name recognized in the United States Pharmacopœia or National Formulary. No further description of the components or qualities is required, except as to content of alcohol, morphine, etc.

(b) The use of a geographical name shall not be permitted in connection with a food or drug product not manufactured or produced in that place, when such name indicates that the article was manufactured or produced in that place.

(c) The use of a geographical name in connection with a food or drug product will not be deemed a misbranding when by reason of long usage it has come to represent a generic term and is used to indicate a style, type, or brand;

but in all cases the State or Territory where any such article is manufactured or produced shall be stated upon the principal label.

(d) A foreign name which is recognized as distinctive of a product of a foreign country shall not be used upon an article of domestic origin except as an indication of the type or style of quality or manufacture, and then only when so qualified that it cannot be offered for sale under the name of a foreign article.

Regulation 20. Distinctive Name.

(Section 8.)

(a) A "distinctive name" is a trade, arbitrary, or fancy name which clearly distinguishes a food product, mixture or compound from any other food product, mixture, or compound.

(b) A distinctive name shall not be one representing any single constituent of a mixture or compound.

(c) A distinctive name shall not misrepresent any property or quality of a mixture or compound.

(d) A distinctive name shall give no false indication of origin, character, or place of manufacture, nor lead the purchaser to suppose that it is any other food or drug product.

Regulation 21. Compounds, Imitations, or Blends Without Distinctive Name.

(Section 8.)

(a) The term "blend" applies to a mixture of like substances, not excluding harmless coloring or flavoring ingredients used for the purpose of coloring and flavoring only.

(b) If any age is stated, it shall not be that of a single one of its constituents, but shall be the average of all constituents in their respective proportions.

(c) Coloring and flavoring cannot be used for increasing the weight or bulk of a blend.

(d) In order that colors or flavors may not increase the volume or weight of a blend, they are not to be used in quantities exceeding 1 pound to 800 pounds of the blend.

(e) A color or flavor cannot be employed to imitate any natural product or any other product of recognized name and quality.

(f) The term "imitation" applies to any mixture or compound which is a counterfeit or fraudulent simulation of any article of food or drug.

Regulation 22. Articles Without a Label.

(Section 8, paragraph 1, under "Drugs;" paragraph 1, under "Foods.")

It is prohibited to sell or offer for sale a food or drug product bearing no label upon the package or no descriptive matter whatever connected with it, either by design, device, or otherwise, if said product be an imitation of or offered for sale under the name of another article.

Regulation 23. Proper Branding not a Complete Guaranty.

Packages which are correctly branded as to character of contents, place of manufacture, name of manufacturer, or otherwise, may be adulterated and hence not entitled to enter into interstate commerce.

Regulation 24. Incompleteness of Branding.

A compound shall be deemed misbranded if the label be incomplete as to the names of the required ingredients. A simple product does not require any further statement than the name or distinctive name thereof, except as provided in Regulations 19 (a) and 28.

Regulation 25. Substitution.

(Sections 7 and 8.)

(a) When a substance of a recognized quality commonly used in the preparation of a food or drug product is replaced by another substance not injurious or deleterious to health, the name of the substituted substance shall appear upon the label.

(b) When any substance which does not reduce, lower, or injuriously effect its quality or strength, is added to a food or drug product, other than is necessary to its manufacture or refining, the label shall bear a statement to that effect.

Regulation 26. Waste Materials.

(Section 8.)

When an article is made up of refure materials, frag-

ments or trimmings, the use of the name of the substance from which they are derived, unless accompanied by a statement to that effect, shall be deemed a misbranding. Packages of such materials may be labelled "pieces," "stems," "trimmings," or with some similar appellation.

Regulation 27. Mixtures or Compounds with Distinctive Names.

(Section 8. First proviso under "Foods," paragraph 1.)

(a) The terms "mixtures" and "compounds" are interchangeable and indicate the results of putting together two or more food products.

(b) These mixtures or compounds shall not be imitations of other articles, whether simple, mixt or compound, or offered for sale under the name of other articles. They shall bear a distinctive name and the name of the place where the mixture or compound has been manufactured or produced.

(c) If the name of the place be one which is found in different States, Territories, or countries, the name of the State, Territory or country, as well as the name of the place, must be stated.

Regulation 28. Substances Named in Drugs or Foods.

(Section 8. Second under "Drugs;" second under "Foods.")

(a) The term "alcohol" is defined to mean common or ethyl alcohol. No other kind of alcohol is permissible in the manufacture of drugs except as specified in the United States Pharmacopœia or National Formulary.

(b) The words alcohol, morphine, etc., and the quantities and proportions thereof, shall be printed in letters corresponding in size with those prescribed in Regulation 17, paragraph (c).

(c) Any drug, or food product except in respect of alcohol, is misbranded in case it fails to bear a statement on the label of the quantity or proportion of any alcohol, morphine, opium, heroin, cocaine, alpha or beta eucaine, chloroform, cannabis, indica, chloral hydrate, or acetanilide, or any derivative or preparation of any such substances contained therein.

(d) A statement of the maximum quantity or proportion of any such substances present will meet the require-

ments, provided the maximum stated does not vary materially from the average quantity or proportion.

(e) In case the actual quantity or proportion is stated it shall be the average quantity or proportion with the variations noted in Regulation 29.

(f) The following are the principal derivatives and preparations made from the articles which are required to be named on the label:

ALCOHOL, ETHYL: (*Cologne spirits, Grain alcohol, Rectified spirits, and Spirits of wine.*)

Derivatives—

Aldehyde, Ether, Ethyl acetate, Ethyl nitrate, and Paraldehyde.

Preparations containing alcohol—

Bitters, Brandies, Cordials, Elixers, Essences, Fluidextracts, Spirits, Sirups, Tinctures, Tonics, Whiskies, and Wines.

MORPHINE ALKALOID:

Derivatives—

Apomorhine, Dionine, Peronine, Morphine acetate, Hydrochloride, Sulphate, and other salts of morphine.

Preparations containg morphine or derivatives of morphine—

Bougies, Catarrh Snuff, Chlorodyne, Compound powder of morphine, Crayons, Elixers, Granules, Pills, Solutions, Sirups, Supositories, Tablets, Triturates, and Troches.

OPIUM GUM:

Preparations of Opium—

Extracts, Denarcotized opium, Granulated opium, and Powdered opium, Bougies, Brown mixture, Carminative mixtures, Crayons, Dover's powder, Elixirs, Liniments, Ointments, Paregoric, Pills, Plasters, Sirups, Suppositories, Tablets, Tinctures, Troches, Vinegars, and Wines.

Derivatives—

Codeine, Alkaloid, Hydrochloride, Phosphate, Sulphate, and other salts of codeine.

Preparations containg codeine or its salts—

Elixirs, Pills, Sirups, and Tablets.

COCAINE, ALKALOID:

Derivatives—

Cocaine hydrochloride, Oleate, and other salts.

Preparations for combining cocaine or salts of cocaine—

Coca leaves, Catarrh powders, Elixirs, Extracts, Infusion of coca, Ointments, Paste pencils, Pills, Solutions, Sirups, Tablets, Tinctures, Troches, and Wines.

HEROIN:

Preparations containing heroin—

Sirups, Elixirs, Pills, and Tablets.

ALPHA AND BETA EUCAINE:

Preparations—

Mixtures, Ointments, Powders, and Solutions.

CHLOROFORM:

Preparations containing chloroform—

Chloranodyne, Elixirs, Emulsions, Liniments, Mixtures, Spirits, and Sirups.

CANNABIS INDICA:

Preparations of cannabis indica—

Corn remedies, Extracts, Mixtures, Pills, Powders, Tablets, and Tinctures.

CHLORAL HYDRATE (*Chloral,* U. S. Pharmacopœia, 1890):

Derivatives—

Chloral acetophenonoxim, Chloral alcoholate, Chloralamide, Chloralimide, Chloral orthoform, Chloralose, Dormiol, Hypnal, and Uraline.

Preparations containing chloral hydrate or its derivatives—

Chloral camphorate, Elixirs, Liniments, Mixtures, Ointments, Suppositories, Sirups, and Tablets.

ACETANILIDE (*Antifebrine, Phenylacetamide*):

Derivatives—

Acetphenetidine, Citrophen, Diacetanilide, Lactophenin, Methoxy-acetanilide, Methylacetanilide, Para-Iodoacetanilide, and Phenacetine.

Preparations containg acetanilide or derivatives—

Analgesics, Antineuralgics, Antirheumatics, Cachets, Capsules, Cold remedies, Elixirs, Granular effervescing salts, Headache powders, Mixtures, Pain remedies, Pills, and Tablets.

Regulation 29. Statement of Weight or Measure.

(Section 8. Third under "Foods.")

(a) A statement of the weight or measure of the food contained in a package is not required. If such statement is printed, it shall be a plain and correct statement of the average net weight or volume, either on or immediately above or below the principal label, and of the size of letters required in Regulation 17.

(b) A reasonable variation from the stated weight for individual packages is permissible, provided this variation is as often above as below the weight or volume stated. This variation shall be determined by the inspector from the changes in the humidity of the atmosphere, from the exposure of the package to evaporation or to absorption of water, and the reasonable variations which attend the filling and weighing or measuring of a package.

Regulation 30. Method of Stating Quantity or Proportion.

(Section 8.)

In case of alcohol the expression "quantity" or "proportion" shall mean the average percentage by volume in the finished product. In the case of the other ingredients required to be named upon the label, the expression of "quantity" or "proportion" shall mean grains or minims per ounce or fluid ounce, and also, if desired, the metric equivalents therefor, or milligrams per gram or cubic centimeter, or grams or cubic centimeters per kilogram or per liter; provided that these articles shall not be deemed misbranded if the maximum of quantity or proportion be stated, as required in Regulation 28 (d).

EXPORTS AND IMPORTS OF FOOD AND DRUGS.

Regulation 31. Preparation of Food Products for Export.

(Section 2.)

(a) Food products intended for export may contain added substances not permitted in foods intended for interstate commerce, when the addition of such substances does not conflict with the laws of the countries to which the food products are to be exported and when such substances are added in accordance with the directions of the foreign purchaser or his agent.

(b) The exporter is not required to furnish evidence that goods have been prepared or packed in compliance with the laws of the foreign country to which said goods are intended to be shipped, but such shipment is made at his own risk.

(c) Food products for export under this regulation shall be kept separate and labeled to indicate that they are for export.

(d) If the products are not exported they shall not be allowed to enter interstate commerce.

Regulation 32. Imported Food and Drug Products.

(Section 11.)

(a) Meat and drug products imported into the United States shall be accompanied by a certificate of official inspection of a character to satisfy the Secretary of Agriculture that they are not dangerous to health, and each package of such articles shall bear a label which shall identify it as covered by the certificate, which certificate shall accompany or be attached to the invoice on which the entry is made.

(b) The certificate shall set forth the official position of the inspector and the character of the inspection.

(c) Meat and meat products as well as all other food and drug products of a kind forbidden entry into or forbidden to be sold, or restricted in sale in the country in which made or from which exported, will be refused admission.

(d) Meat and meat products which have been inspected and past through the customs may, if identiy is retained, be transported in interstate commerce.

Regulation 33. Declaration.

(Section 11.)

(a) All invoices of food or drug products shipped to the United States shall have attached to them a declaration of the shipper, made before a United States consular officer, as follows:

I, the undersigned, do solemnly and truly declare that I am the ..... of the merchandise herein mentioned
(Manufacturer, agent, or shipper.)
and described, and that it consists of food or drug products which contain no added substances injurious to health.

These products were grown in ..... and manufactured
(Country.)
in ..... by .... during the year ....., and
(Country.) (Name of manufacturer.)
are exported from ..... and consigned to ..... The
(City.) (City.)
products bear no false labels or marks, contain $\begin{matrix}\text{no}\\\text{some}\end{matrix}$ added
coloring matter or preservative ....., and are not of a
(Name of added color or preservative.)
character to cause prohibition or restriction in the country where they were made or from which exported.

Dated at .... this .... day of ...., 19...

(Signed): ....

(b) In the case of importations to be entered at New York, Boston, Philadelphia, Chicago, San Francisco, and New Orleans, and other ports where food and drug inspection laboratories shall be established, this declaration shall be attached to the invoice on which entry is made. In other cases the declaration shall be attached to the copy of the invoice sent to the Bureau of Chemistry.

Regulation 34. Denaturing.

[As amended by F. I. D. 93, May 12, 1908.]

(Section 11.)

Unless otherwise declared on the invoice, all substances ordinarily used as food products will be treated as such. Shipments of substances ordinarily used as food products intended for technical purposes should be accompanied by a declaration stating that fact. Should products should be denatured before entry, but denaturing may be allowed under customs supervision with the consent of the Secretary of the Treasury, or the Secretary of the Treasury may release such products without denaturing, under such conditions as may preclude the possibility of their use as food products.

Regulation 35. Bond, Imported Foods, and Drugs.

(Section 11.)

Unexamined packages of food and drug products may be delivered to the consignee prior to the completion of the examination to determine whether the same are adulterated or misbranded upon the execution of a penal bond by the consignee in the sum of the invoice value of such goods

with the duty added, for the return of the goods to customs custody.

Regulation 36. Notification of Violation of the Law.

(Section 11.)

If the sample or analysis or examination be found not to comply with the law, the importer shall be notified of the nature of the violation, the time and place at which final action will be taken upon the question of the exclusion of the shipment, and that he may be present, and submit evidence (Form No. 5), which evidence, with a sample of the article, shall be forwarded to the Bureau of Chemistry at Washington, accompanied by the appropriate report card.

Regulation 37. Appeal to the Secretary of Agriculture and Remuneration.

(Section 11.)

All applications for relief from decision arising under the execution of the law should be addressed to the Secretary of Agriculture, and all vouchers or accounts for remuneration for samples shall be filed with the chief of the inspection laboratory, who shall forward the same with his recommendation, to the Department of Agriculture for action.

Regulation 38. Shipment Beyond the Jurisdiction of the United States.

(Section 11.)

The time allowed the exporter for representations regarding the shipment may be extended at his request to permit him to secure such evidence as he desires, provided that this extension of time does not entail any expense to the Department of Agriculture. If at the expiration of this time, in view of the data secured in inspecting the sample and such evidence as may have been submitted by the manufacturers or importers, it appears that the shipment cannot be legally imported into the United States, the Secretary of Agriculture shall request the Secretary of the Treasury to refuse to deliver the shipment in question to the consignee, and to require its reshipment beyond the jurisdiction of the United States.

Regulation 39. Application of Regulations.

These regulations shall not apply to domestic meat and

meat food products which are prepared, transported, or sold in interstate or foreign commerce under the meat-inspection law and the regulations of the Secretary of Agriculture made thereunder.

Regulation 40. Alteration and Amendment of Regulations.

These regulations may be altered or ammended at any time, without previous notice, with the concurrence of the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of Commerce and Labor

The above rules and regulations are hereby adopted.

LESLIE M. SHAW,
Secretary of the Treasury.
JAMES WILSON,
Secretary of Agriculture.
VICTOR H. METCALF,
Secretary of Commerce and Labor.

WASHINGTON, D. C., October 17, 1906.

THE FOOD AND DRUGS ACT, JUNE 30, 1906.

AN ACT for preventing the manufacture, sale, or transportation of adulterated or misbranded or poisonous or deleterious foods, drugs, medicines, and liquors, and for regulating traffic therein, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall be unlawful for any person to manufacture within any Territory or the District of Columbia any article of food or drug which is adulterated or misbranded, within the meaning of this Act; and any person who shall violate any of the provisions of this section shall be guilty of a misdemeanor, and for each offense shall, upon conviction thereof, be fined not to exceed five hundred dollars or shall be sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court, and for each subsequent offense and conviction thereof shall be fined not less than one thousand dollars or sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court.

SEC. 2. That the introduction into any State or Territory or the District of Columbia from any other State or Territory or the District of Columbia, or from any foreign country, or shipment to any foreign country of any article

of food or drugs which is adulterated or misbranded, within the meaning of this Act, is hereby prohibited; and any person who shall ship or deliver for shipment from any State or Territory or the District of Columbia, or to a foreign country, or who shall receive in any State or Territory or the District of Columbia from any other State or Territory or the District of Columbia, or foreign country, and having so received, shall deliver in original unbroken packages, for pay or otherwise, or offer to deliver to any other person, any such article so adulterated or misbranded within the meaning of this Act, or any person who shall sell or offer for sale in the District of Columbia or the Territories of the United States any adulterated or misbranded foods or drugs, or export or offer to export the same to any foreign country, shall be guilty of a misdemeanor, and for such offense be fined not exceeding two hundred dollars for the first offense, and upon conviction for each subsequent offense not exceeding three hundred dollars or be imprisoned not exceeding one year, or both, in the discertion of the court: *Provided,* That no article shall be deemed misbranded or adulterated within the provisions of this Act when intended for export to any foreign country and prepared or packed according to the specifications or directions of the foreign purchaser when no substance is used in the preparation or packing thereof in conflict with the laws of the foreign country to which said article is intended to be shipped; but if said article shall be in fact sold or offered for sale for domestic use or consumption, then this proviso shall not exempt said article from the operation of any of the other provisions of this Act.

SEC. 3. That the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of Commerce and Labor shall make uniform rules and regulations for carrying out the provisions of this Act, including the collection and examination of specimens of foods and drugs manufactured or offered for sale in the District of Columbia, or in any Territory of the United States, or which shall be offered for sale in unbroken packages in any State other than that in which they shall have been respectively manufactured or produced, or shall be received from any foreign country, or intended for shipment to any foreign country,

or which may be submitted for examination by the chief health, food, or drug officer of any State, Territory, or the District of Columbia, or at any domestic or foreign port through which such product is offered for interstate commerce, or for export, or for import between the United States and any foreign port or country.

SEC. 4. That the examination of specimens of foods and drugs shall be made in the Bureau of Chemistry of the Department of Agriculture, or under the direction and supervision of such Bureau, for the purpose of determining from such examination whether such articles are adulterated or misbranded within the meaning of this Act; and if it shall appear from any such examination that any of such specimens is adulterated or misbranded within the meaning of this Act, the Secretary of Agriculture shall cause notice thereof to be given to the party from whom such sample was obtained. Any party so notified shall be given an opportunity to be heard, under such rules and regulations as may be prescribed as aforesaid, and if it appears that any of the provisions of this Act have been violated by such party, then the Secretary of Agritculture shall at once certify the facts to the proper United States District Attorney, with a copy of the desults of the analysis or the examination of such article duly authenticated by the analyst or officer making such examination, under the oath of such officer. After judgment of the court, notice shall be given by publication in such manner as may be prescribed by the rules and regulations aforesaid.

SEC. 5. That it shall be the duty of each district attorney to whom the Secretary of Agriculture shall report any violation of this Act, or to whom any health or food or drug officer or agent of any State, Territory, or the District of Columbia shall present satisfactory evidence of any such violation, to cause appropriate proceedings to be commenced and prosecuted in the proper courts of the United States, without delay, for the enforcement of the penalties as in such case herein provided.

SEC. 6. That the term "drug," as used in this Act, shall include all medicines and preparations recognized in the United States Pharmacopœia or National Formulary for internal or external use, and any substance or mixture of

substances intended to be used for the cure, mitigation, or prevention of disease of either man or other animals. The term "food," as used herein, shall include all articles used for food, drink, confectionery, or condiment by man or other animals, whether simple, mixed, or compound.

SEC. 7. That for the purposes of this Act an article shall be deemed to be adulterated:

In case of drugs:

First. If, when a drug is sold under or by a name recognized in the United States Pharmacopœia or National Formulary, it differs from the standard of strength, quality, or purity, as determined by the test laid down in the United States Pharmacopœia or National Formulary official at the time of investigation: *Provided,* That no drug defined in the United States Pharmacopœia or National Formulary shall be deemed to be adulterated under this provision if the standard of strength, quality, or purity be plainly stated upon the bottle, box, or other container thereof although the standard may differ from that determined by the test laid down in the United States Pharmacopœia or National Formulary.

Second. If its strength or purity fall below the professed standard or quality under which it is sold.

In the case of confectionery:

If it contain terra alba, barytes, talc, chrome yellow, or other mineral substance or poisonous color or flavor, or other ingredient deleterious or detrimental to health, or any vinous, malt, or spirituous liquor or compound or narcotic drug.

In the case of food:

First. If any substance has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength.

Second. If any substance has been substituted wholly or in part for the article.

Third. If any valuable constituent of the article has been wholly or in part abstracted.

Fourth. If it be mixed, colored, powdered, coated or stained in a manner whereby damage or inferiority is concealed.

Fifth. If it contain any added poisonous or other added

deleterious ingredient which may render such article injurious to health: *Provided,* That when in the preparation of food products for shipment they are preserved by any external application applied in such manner that the preservative is necessarily removed mechanically, or by maceration in water, or otherwise, and directions for the removal of said preservative shall be printed on the covering of the package, the provisions of this Act shall be construed as applying only when said products are ready for consumption.

Sixth. If it consists in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance, or any portion of an animal unfit for food, whether manufactured or not, or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

SEC. 8. That the term "misbranded" as used herein, shall apply to all drugs or articles of food, or articles which enter into the composition of food, the package or label of which shall bear any statement, design, or device regarding such article, or the ingredients or substances contained therein which shall be false or misleading in any particular, and to any food or drug product which is falsely branded as to the State, Territory, or country in which is is manufactured or produced. ?

That for the purposes of this Act an article shall also be deemed to be misbranded:

In case of drugs:

First. If it be an imitation of or offered for sale under the name of another article.

Second. If the contents of the package as originally put up shall have been removed, in whole or in part, and other contents shall have been placed in such package, or if the package fail to bear a statement on the label of the quantity or proportion of any alcohol, morphine, opium, cocaine, heroin, alpha or betta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative or preparation of any such substances contained therein.

In the case of food:

First. If it be an imitation of or offered for sale under the distinctive name of another article.

Second. If it be labeled or branded so as to deceive or mislead the purchaser, or purport to be a foreign product

when not so, or if the contents of the package as originally put up shall have been removed, in whole or in part, and other contents shall have been placed in such package, or if it fail to bear a statement on the label of the quantity or proportion of any morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative or preparation of any such substances contained therein.

Third. If in package form, and the contents are stated in terms of weight or measure, they are not plainly and correctly stated on the outside of the package.

Fourth. If the package containing it or its label shall bear any statement, design, or device regarding the ingredients or the substances contained therein, which statement, design, or device shall be false or misleading in any particular: *Provided,* That an article of food which does not contain any added poisonous or deleterious ingredients shall not be deemed to be adulterated or misbranded in the following cases:

First. In the case of mixtures or compounds which may be now or from time to time hereafter known as articles of food, under their own distinctive names, and not an imitation of or offered for sale under the distinctive name of another article, if the name be accompanied on the same label or brand with a statement of the place where said article has been manufactured or produced.

Second. In the case of articles labeled, branded or tagged so as to plainly indicate that they are compounds, imitations, or blends, and the word "compound," "imitation," or "blend," as the case may be, is plainly stated on the package in which it is offered for sale: *Provided,* That the term blend as used herein shall be construed to mean a mixture of like substances, not excluding harmless coloring or flavoring ingredients used for the purpose of coloring and flavoring only: *And provided further,* That nothing in this Act shall be construed as requiring or compelling proprietors or manufacturers of proprietary foods which contain no unwholesome added ingredient to disclose their trade formulas, except in so far as the provisions of this Act may require to secure freedom from adulteration or misbranding.

SEC. 9. That no dealer shall be prosecuted under the provisions of this Act when he can establish a guaranty signed by the wholesaler, jobber, manufacturer, or other party residing in the United States, from whom he purchases such articles, to the effect that the same is not adulterated or misbranded within the meaning of this Act, designating it. Said guaranty, to afford protection, shall contain the name and address of the party or parties making the sale of such articles to such dealer and in such case said party or parties shall be amenable to the prosecutions, fines, and other penalties which would attach, in due course, to the dealer under the provisions of this Act.

SEC. 10. That any article of food, drug, or liquor that is adulterated or misbranded within the meaning of this Act, and is being transported from one State, Territory, District, or insular possession to another for sale, or, having been transported, remains unloaded, unsold, or in original unbroken packages, or if it be sold or offered for sale in the District of Columbia or the Territories, or insular possessions of the United States, or if it be imported from a foreign country for sale, or if it is intended for export to a foreign country, shall be liable to be proceeded against in any district court of the United States within the district where the same is found, and seized for confiscation by a process of libel for condemnation. And if such article is condemned as being adulterated or misbranded, or of a poisonous or deleterious character, within the meaning of this Act, the same shall be disposed of by destruction or sale, as the said court may direct, and the proceeds thereof, if sold, less the legal costs and charges, shall be paid into the Treasury of the United States, but such goods shall not be sold in any jurisdiction contrary to the provisions of this Act or the laws of that jurisdiction: *Provided, however,* That upon the payment of the costs of such libel proceedings and the execution and delivery of a good and sufficient bond to the effect that such articles shall not be sold or otherwise disposed of contrary to the provisions of this Act, or the laws of any State, Territory, District, or insular possession, the court may by order direct that such articles be delivered to the owner thereof. The proceedings of such libel cases shall conform, as near as may be, to the proceedings in ad-

miralty, except that either party may demand trial by jury of any issue of fact joined in any such case, and all such proceedings shall be at the suit of and in the name of the United States.

SEC. 11. The Secretary of the Treasury shall deliver to the Secretary of Agriculture, upon his request from time to time, samples of foods and drugs which are being imported into the United States or offered for import, giving notice thereof to the owner or consignee, who may appear before the Secretary of Agriculture, and have the right to introduce testimony, and if it appear from the examination of such samples that any article of food or drug offered to be imported into the United States is adulterated or misbranded within the meaning of this Act, or is otherwise dangerous to the health of the people of the United States, or is of a kind forbidden entry into, or forbidden to be sold or restricted in sale in the country in which it is made or from which it is exported, or is otherwise falsely labeled in any respect, the said article shall be refused admission, and the Secretary of the Treasury shall refuse delivery to the consignee and shall cause the destruction of any goods refused delivery which shall not be exported by the consignee within three months from the date of notice of such refusal under such regulations as the Secretary of the Treasury may prescribe: *Provided,* That the Secretary of the Treasury may deliver to the consignee such goods pending examination and decision in the matter on execution of a penal bond for the amount of the full invoice value of such goods, together with the duty thereon, and on refusal to return such goooods for any cause to the custody of the Secretary of the Treasury, when demanded, for the purpose of excluding them from the country, or for any other purpose, said consignee shall forfeit the full amount of the bond: *And provided further,* That all charges for storage, cartage, and labor on goods which are refused admission or delivery shall be paid by the owner or consignee, and in default of such payment shall constitute a lein against any future importation made by such owner or consignee.

SEC. 12. That the term "Territory" as used in this Act shall include the insular possessions of the United States. The word "person" as used in this Act shall be construed to

import both the plural and the singular, as the case demands, and shall include corporations, companies, societies and associations. When construing and enforcing the provisions of this Act, the act, omission, or failure of any officer, agent, or other person acting for or employed by any corporation, company, society, or association, within the scope of his employment or office, shall in every case be also deemed to be the act, omission, or failure of such corporation, company, society, or association as well as that of the person.

SEC. 13. That this Act shall be in force and effect from and after the first day of January, nineteen hundred and seven.

Approved, June 30, 1906.

(F. I. D. 40.)
FILING GUARANTY.

In order that both the Department and the manufacturer may be protected against fraud it is requested that all guaranties of a general character filed with the Secretary of Agriculture in harmony with Regulation 9, Rules and Regulations for the Enforcement of the Food and Drugs Act, June 30, 1906, be acknowledged before a notary or other official authorized to affix a seal. Attention is called to the fact that when a general guaranty has been thus filed every package of articles of foods and drugs put up under the guaranty should bear the legend, "Guaranteed under the Food and Drugs Act, June 30, 1906," and also the serial number assigned thereto, if the dealer is to receive the protection contemplated by the guaranty. No other word should go upon this legend or accompany it in any way. Particular attention is called to the fact that nothing should be placed upon the label, or in any printed matter accompanying it, indicating that the guaranty is made by the Department of Agriculture. The appearance of the serial number with the phrase above mentioned upon a label does not exempt it from inspection nor its guarantor from prosecution in case the article in question be found in any way to violate the food and drugs act of June 30, 1906.

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., October 25, 1906.

(F. I. D. 41.)

APPROVAL OF LABELS.

Numerous requests are referred to this Department for the approval of labels to be used in connection with articles of foods and drugs under the food and drugs act of June 30, 1906. This act does not authorize the Secretary of Agriculture nor any agent of the Department to approve labels. The Department therefore will not give its approval to any label. Any printed matter upon the label implying that this Department has approved it will be without warrant. It is believed that with the law and regulations before him the manufacturer will have no difficulty in arranging a label in harmony with the requirements set forth. If there be questions on which there is doubt respecting the general character of labels, decisions under the food and drugs act will be rendered, of a public character and published from time to time, covering such points.

Approved:

JAMES WILSON,

WASHINGTON, D. C., October 25, 1906.

F. I. D. 46 (AS AMENDED).

[Superseding F. I. D. 46, December 13, 1906.]

FICTITIOUS FIRM NAMES.

F. I. D. 46, issued on December 13, 1906, on the subject of fictitious firm names, is hereby amended to read as follows, for the purpose of obviating any ambiguity that may have existed in the original decision. The amended portion is set in italics.

The following extract from a letter is typical of a question frequently asked:

In connection with our manufacture of flavoring extracts, we produce an article containing a certain percentage of artificial coumarin and vanillin. This product has been placed on the market under the name of ——— and Company, a fictitious firm, although dealers have always understood that it was our product. Is there any objection to our continuing to brand the product as manufactured by ——— and Company?

The same question has frequently been asked by im-

porters who state that they desire to assume the responsibility for particular brands.

It has been held by the Attorney General (F. I. D. 2) that—

the words " * * * Daisy Sugar Corn, ——— ——— Company, Milwaukee, Wis,," clearly imply that the goods referred to are manufactured or prepared by that company in Wisconsin. The general public, unfamiliar with trade practices, would inevitably reach that conclusion.

Regulation 18 provides that if the name of the manufacturer and the place of manufacture be given, they must be the true name and the true place. It would appear, therefore, that the use of a fictitious name in such a manner that it would be understood to be the name of the manufacturer would be clearly a violation of Regulation 18. It is apparent that the provisions of Regulation 18 will not be fulfilled by the nominal incorporation of a fictitious firm. The regulations require that goods must be actually manufactured by the firm represented on the label as the manufacturer.

When a proper name, other than that of the manufacturer, is placed upon a label it must not be used in the possessive. For instance,

CHARLES GASTON'S
OLIVE OIL
BORDEAUX

can only be properly used on an oil manufactured by Charles Gaston at Bordeaux. The same is true if the designation

GASTON'S
OLIVE OIL
BORDEAUX

be employed.

On the other hand, the word "Gaston" might be used in an objective sense, and not in the possesive case as qualifying the words "olive oil," in a manner that would indicate that it represented a brand and not a manufacturer, as

GASTON OLIVE OIL.

Or,

OLIVE OIL, GASTON BRAND.

In such case, however, neither given name nor initials should be employed. The word "Gaston" should be in the same type as "olive oil" and in equal prominence, thus forming a part of the label.

The phrase "Olive Oil, Charles Gaston Brand," may be used, in which case the name of the actual manufacturer should appear, in order that no false indication of the name of the person or firm manufacturing the product may be given.

JAMES WILSON.
Secretary of Agriculture.

Approved:
WASHINGTON, D. C., February 21, 1907.

(F. I. D. 47.)
FLAVORING EXTRACTS.

The percentage of alcohol is not required to be stated in the case of extracts sold for the preparation of foods only. It is held, however, that the extracts which are sold or used for any medicinal purpose whatever should have the percentage of alcohol stated on the label.

Numerous inquiries are received regarding the proper designation of products made in imitation of flavoring extracts or in imitation of flavors. Such products include "Imitation vanilla flavor," which is made from such products as tonka extract, coumarin, and vanillin, with or without vanilla extract. They may also include numerous preparations made from synthetic fruit ethers intended to imitate strawberry, banana, pineapple, etc. Such products should not be so designated as to convey the impression that they have any relation to the flavor prepared from the fruit. Even when it is not practicable to prepare the flavor directly from the fruit, "imitation" is a better term than "artificial."

These imitation products should not be designated by terms which indicate in any way by similarity of name that they are prepared from a natural fruit or from a standard flavor. The term "venallos" for instance, would not be a proper descriptive name for a preparation intended to imitate vanilla extract. Such products should either be designated by their true names, such as "vanilla and vanillin flavor," "vanillin and coumarin flavor," or by such terms as "imitation vanilla flavor" or "vanilla substitute."

Articles in the preparation of which such substitutes are employed should not be labeled as if they were prepared from standard flavors or from the fruits themselves. For instance, ice cream flavored with imitation strawberry flavor

should not be designated as "strawberry ice cream.' If sold as "strawberry ice cream" without a label the product would appear to be inviolation of Regulation 22.

Artificial colors should be declared whenever present.

JAMES WILSON.
Secretary of Agriculture.

WASHINGTON, D. C., December 13, 1906.

(F. I. D. 48.)
SUBSTANCES USED IN THE PREPARATION OF FOODS.

The following letter was recently received at the Department of Agriculture:

We import a preparation of gelatin preserved with sulphurous acid for the purpose of fining wine. This gelatin is not used as a food and does not remain in the wine, although a small amount of the sulphurous acid may be left in the wine. Please inform us if the sale of this product is a violation of the food law.

It is held that the products commonly added to foods in their preparation are properly classed as foods and come within the scope of the food and drugs act. The Department cannot follow a food product into consumption in order to determine the use to which it is put. Pending a decision on the wholesomeness of sulphurous acid as provided in Regulation 15 (b), its presence should be declared.

JAMES WILSON.
Secretary of Agriculture.

WASHINGTON, D. C., December 13, 1906.

(F. I. D. 50.)
IMITATION COFFEE.

A manufacturer writes as follows:

We beg to ask for your opinion as regards the hyphenated word "Cereal-Coffee," and whether or not we are entitled to its use for a cereal substitute for coffee. * * * In our opinion the term "Cereal-Coffee" would come under the so-called trade name and distinctive name.

It is held that since the product mentioned is not a coffee it can not be properly called by the term mentioned. Regulation 20 (d) provides that a distinctive name shall give no

false indication of character. The use of the name "cereal-coffee" might be taken to indicate that the product is coffee or has the properties of coffee, and hence the use of the term does not comply with the definition of distinctive name. Even if the product consist in part of coffee, the name would not be correct. It is suggested that products of this nature be designated as "imitation coffee," as provided in Regulation 21 (f). In such case the word "imitation" should be in uniform type, on uniform background, and should be given equal prominence with the word "coffee."

JAMES WILSON.
Secretary of Agriculture.

WASHINGTON, D. C., January 18, 1907.

(F. I. D. 51.)
COLORING OF BUTTER AND CHEESE.

Numerous inquiries, of which the following is an illustration, have been received by the Department:

"Will you kindly inform me concerning the coloring of butter and cheese under the pure-food law? Would it be unlawful to color butter and cheese as now practiced?"

The coloring of butter is specifically permitted in the law of August 2, 1886 (24 Stat., 209), and the coloring of cheese in the law of June 6, 1896 (29 Stat., 253). It is held by the Department that the food and drugs act does not repeal the provisions of the acts referred to above and the addition of harmless color to these substances may be practiced as therein provided, and that the presence of coloring matter specifically recognized by acts of Congress as a constituent is not required to be declared on the label.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., January 18, 1907.

(F. I. D. 52.)
FORM OF LABEL.

The following is an extract from a letter recently received:

"We do not understand the requirements of the regulations respecting the arrangement of labels; that is, the order

in which the various features of the label should be arranged."

To meet the requests for the opinion of the Department regarding the proper arrangement of a label, the following order is suggested:

1. Name of substance or product.

2. In case of foods, words which indicate that the articles are compounds, mixtures, or blends, and the word "Imitation," "Compound," or "Blend," as the case may be.

3. Statements designating the quantity or proportion of the ingredients enumerated in the law, or derivatives and preparations of same, * as mentioned under Regulation 28; also statements of other extraneous substances whose presence should be declared, such as harmless coloring matter, or any necessary statement regarding grade or quality.

(The statements specified in paragraphs 1, 2, and 3, should appear together without any intervening descriptive or explanatory matter.)

4. Name of manufacturer (if given).

5. Place of manufacture (if given, or when required in case of food mixtures or compounds bearing a distinctive name).

It is stated in Regulation 17 that if the name of the manufacturer and place of manufacture be given they should appear upon the principal label. Although the law does not require that the name of the manufacturer be given, or the place of manufacture, except in case of food mixtures and compounds having a distinctive name, it is held that if they are given they must be true, and should be placed with the required information on the principal label. The arrangement of the label is the same for both food and drug products and an example of each is given.

Attention is called to the fact that the declaration of alcohol and its derivatives is not required in foods.

Sample label for food product.

[Name of product.]

[Declaration required by paragraphs 2 and 3.]

[Name of manufacturer, if given.]
[Place of manufacture, if given.]

KETCHUP.

ARTIFICIALLY COLORED.

[Descriptive matter, if desired, but preferably at bottom of label.]

BLANK & CO.,
PORTLAND, ME.

[Descriptive matter, if desired.]

Sample label for drug product.

[Name of product.]

[Declaration required by paragraphs 2 and 3.]

[Name of manufacturer, if given.]
[Place of manufacture, if given.]

COUGH SYRUP.

ALCOHOL, 10 PER CENT.
MORPHINE, ½ GRAIN PER OUNCE.
CHLOROFORM, 40 MINIMS PER OUNCE.

[Descriptive matter, if desired, but preferably at bottom of label.]

JOHN JONES & CO.,
WASHINGTON, D. C.

[Descriptive matter, if desired.]

Any descriptive or explanatory matter that may appear on the principal label, therefore, should be placed at the bottom of the label, or between No. 3 and No. 4, and should be clearly separated from other features of the label by means of a suitable line or space. Statements regarding the reason for using alcohol, artificial coloring matter, and other extraneous substances, come under the head of descriptive or explanatory matter, and should not be interspersed with the declarations required under Nos. 2 and 3.

The information called for under No. 3 should be so worded as to give only the required information, as, for example, "alcohol 17 per cent." or "artificially colored." All numbers used in expressing quantity or proportion of substances required to be stated (see Regulation 28) should be expressed in the Arabic notation.

Each substance required to be declared under No. 3 should be printed on a separate line and in type specified in Regulation 17 (c).

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., January 18, 1907.

(F. I. D. 53.)

FORMULA ON THE LABEL OF DRUGS.

Many inquiries are received relative to the necessity of giving the formula of medicinal remedies on the label. The following is typical:

"I should like to know if it will be necessary for me to state on a label the name of the products from which I prepare my proprietary medicine in order to conform with the pure food and drugs act. If I do this, it will prohibit me from manufacturing and selling a remedy which is a secret of my own; and anyone buying it could, from the label, tell what ingredients were used in its preparation and make his own supply of medicine. How does the United States Government expect to protect those who have secret medicinal preparations they wish to sell at a profit? If the Pure Food Commission desires, I will send them a sample bottle of my medicine for their inspection and approval."

The food and drugs act, June 30, 1906, does not require the formula of drug products to be given on the label, but requires only that the quantity or proportion of the ingredients enumerated in the law, and derivatives and preparations of same (Regulation 28), shall be clearly set forth on the label or labels of all preparations used for the treatment or prevention of disease, either externally or internally, for man or other animals. This includes sample packages as well as regular trade packages.

The question is also frequently asked whether a medicinal preparation would be exempt from the operation of

the law if the formula were given on the label. The formula on the label is very desirable, but this information is not required by law. The act forbids the use of any statement, design, or device in connection with any drug product which is false or misleading in any particular. A defect of this kind would not be corrected by giving the formula on the label. If the formula is given, it must be the correct and complete formula. It is held that, in addition to those substances required by the act to be named, if only a part of the active medicinal agents used in the manufacture of a drug product are set forth on the label, such a procedure is misleading and therefore forbidden by the law. All drug products and their labels must conform to the act, whether the formula is or is not given on the label.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., January 28, 1907.

(F. I. D. 54.)

DECLARATION OF THE QUANTITY OR PROPORTION OF ALCOHOL PRESENT IN DRUG PRODUCTS.

The question of stating the percentage of alcohol present in drug products has caused a multitude of inquiries. The following questions along this line serve as examples:

"Is it necessary to give the amount of alcohol present in U. S. Pharmacopœial or National Formulary products? It seems to me that such a requirement is absurd, and not contemplated within the spirit of the act. None of them are patent medicines. Will I be compelled to tell how much alcohol is present in such goods?

"If we apply for and obtain a serial number, must we in addition to putting this number on our labels state the per cent of alcohol?

"Will it be necessary to give the per cent of alcohol present in such products as ether, chloroform, collodion, spirit of nitrous ether, and similar preparations?"

The law is specific on the subject of declaring the amount of alcohol present in medicinal agents, as can readily be seen from the following language: "An article shall also be deemed misbranded * * * if the package fail to bear a

statement on the label of the quantity or proportion of any alcohol * * * contained therein." No medicinal preparations are exempt, whether they are made according to formulæ given in the U. S. Pharmacopœia or National Formulary of formulæ taken from any other source. The serial number, with or without the guarantee legend, does not exempt a preparation from this requirement. The law does not make any statement as to the amount of alcohol that may or may not be employed. It requires, however, that whatever amount be present shall be set forth on the label. The percentage of alcohol given on the label should be the percentage of absolute alcohol by volume contained in the finished product. The manner in which it should be printed is shown in F. I. D. 52.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., March 13, 1907.

(F. I. D. 55.)

METHOD OF STATING QUANTITY OR PROPORTION OF PREPARATIONS (CONTAINING OPIUM, MORPHINE, ETC.) USED IN MANUFACTURING OTHER PREPARATIONS.

Many inquiries are received as to the method of stating the quantity or proportion of preparations (containing opium, morphine, etc.) used in the manufacture of other preparations. Of these the following are typical:

"If the label on the bottle were to bear the words "Tincture of Opium," I reason that as this is a definite preparation, constituting a preparation of opium, and so definite as to its composition that to any intelligent person it expresses definitely all that it is desirable to express, the use of this title alone should be sufficient. I feel that as a preparation it is distinct from opium, and if this particular tincture is used in the manufacture of a preparation the mention of it alone should be sufficient.

"Where extract or tincture of cannabis indica, or extract of opium, is employed in making other drug products, would it not be complying with the law if the use of such articles be clearly indicated on the label as prescribed by the law, or

is it necessary to give the actual amounts of the drugs themselves represented by these preparations?"

Names of drug products bearing any of the names of the ingredients enumerated in the act are construed as representing "preparations" within the meaning of the act; and if the same are clearly declared upon the label as required by Regulations 17 and 30, it will not be necessary to give the actual amount of the primary drugs used or represented by such article. It is desirable, however, that the word or words used in the law shall constitute the first part of the name of the product. For example: "Opium, Tincture of;" "Cannabis Indica,' Extract of," followed by the amount of tincture or extract used.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., March 13, 1907.

(F. I. D. 56.)

NAMES TO BE EMPLOYED IN DECLARING THE AMOUNT OF THE INGREDIENTS AS REQUIRED BY THE LAW.

Many inquiries are coming to this Department relative to the names that may be employed in declaring the quantity or proportion of the ingredients, as required by Congress.

The following are representative:

"The word 'alcohol' has received so much unfavorable notoriety during the last few years that we hesitate to place it upon our labels. Could we not employ some other words in place of it, such as 'cologne spirits,' 'spirits of wine,' 'pure grain alcohol,' etc.?

"Would it be satisfactory for use to use 'Phenylacetamide,' or the following formula, $C_6H_5NH(CH_3CO)$, for the chemical acetalilide?

"One of our preparations contains trichlorethidene ethyl alcoholate, which would undoubtedly under the law be considered a derivative of chloral hydrate. Will it be satisfactory for use to use this name on our trade packages in giving the amount of this chemical present in the product?

"In the manufacture of some of our products we use opium. It would, however, be a financial loss to state this fact on the label. Could we not say this preparations con-

tains 20 grains of the concentrated extract of *Papaver somniferum* to the fluid ounce?

"Dover's powder is mentioned in the regulations as one of the preparations of opium. It would seem at first glance that Dover's powder as a preparation, if mentioned on the label, would be all that could be required as to opium."

One of the objects of the law is to inform the consumer of the presence of certain drugs in medicines, and the above terms do not give the average person any idea as to the presence or absence of such drugs. In enumerating the ingredients, the quantity or proportion of which is required to be given upon the principal label of any medicinal preparation in which such ingredients may be present, the act uses only common names, and the permission to use any but such common names for any ingredients required to be declared upon the label is neither expressed nor implied in any part of the law.

The term used for acetanilide is "acetanilide," and not phenylacetamide. No reference is made to the use of the chemical formula in designating the presence of chemicals. The words "chloral hydrate" appear in the act, but not the chemical name crichlorethidene glycol. It can readily be seen that if the act were not closely adhered to in this connection there would soon be such a confusion and multiplicity of names and phrases that one of the objects of the act would be defeated.

The names to be employed in stating the quantity or proportion of the ingredients required by the act to appear on the label of all medicinal preparations containing same are—

First. Those used in the law for the articles enumerated; example, "alcohol," not "spiritus rectificatus."

Second. In the case of derivatives: (*a*) The name of the parent substance used in the act should constitute part of the name; example, "chloral acetone," not "trichlorethidene dimethyl ketone." (*b*) The trade name, accompanied in parentheses by the name of the parent substance; example, "dionine (morphine derivative)."

Third. Names of preparations containing the name of some ingredient used in the act. In such cases the name used in the act should constitute the first portion of the name of the preparation. (See F. I. D. 55.)

Fourth. Common names (such as laudanum, Dover's powder, etc.) of preparations containing an ingredient enumerated in the law, provided such name or names are accompanied in parentheses by some such phrase as "preparation of opium" or "opium preparation," followed by the number of minims or grains, as specified in the regulations; for instance, "laudanum (preparation of opium), 40 minims per ounce."

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., March 13, 1907.

(F. I. D. 57.)

PHYSICIANS' PRESCRIPTIONS.

The Status of Packages Compounded According to Physicians' Prescriptions and Entering into Interstate Commerce.

Packages resulting from the compounding of physicians' prescriptions under the food and drugs act are the subject of many queries, of which the following are representative:

"If a druggist compounds a physician's prescription and sends it into an adjoining State, will it be necessary to state upon the label the amount of alcohol, morphine, etc., that may be present.

"Supposing a regularly licensed practicing physician has patients located in various States of the Union and supplies medicines to them through the mails, by express, and otherwise, do such packages come under the provisions of the law, and, if so, can the required information be given in pen and ink on the label?

"We treat drug addictions on a very gradual tonic treatment reduction plan. For instance, if John Doe writes for information as to the home treatment for his addiction, I send him a symptom blank which contains, among other questions, an inquiry as to the kind of drug he uses, how he uses it, the length of time he has used it, etc. In addition to giving me a complete history of his case, he states he is using 10 grains of sulph. of morphine (each twenty-four hours), hypodermically or internally, as the case may be. In prescribing in his case I immediately put him on just one-half of the amount he reports as his daily allowance, combining same with a bitter tonic.

"It is necessary for the reduction in drug cases to be made without the patient's knowledge. It is, of course, understood by all physicians that you cannot trust a drug habitue to properly make his own reductions, for, as a matter of fact, if he knew to what extent I was reducing his daily allowance of opiates, he would imagine the reduction too rapid, he would get frightened, and would take to his former drug for relief. Treatment prepared in this way I do not think would come under the head of a proprietary preparation or a patent medicine, as I prescribe the contents of each bottle to meet the requirements of each individual patient. All instructions as to the conduct of treatment and the use of auxiliary remedies are given by letter; consequently there are no printed labels or cartons containing any claims concerning the efficacy of this treatment.

"I would be pleased to have you inform me whether in your opinion I would be violating the pure-food law in any manner, shape, or form should I continue to label my preparations as I am now doing, and in having them prepared in ——— and forwarded direct to my patients in this and other States."

"If a package compounded according to a physician's prescription be shipped, sent, or transported from any State or Territory or the District of Columbia to another State or Territory or the District of Columbia by a compounder, druggist, physician, or their agents, by mail, express, freight, or otherwise, the label upon such package is required to bear the information called for by Congress. If, however, the patient himself or a member of his household, or the physician himself carries such package across a State line, and such package is not subject to sale, it is held that such package need not be marked so as to conform with the law, because such a transaction is not considered one of interstate commerce.

The package may be marked so as to comply with the act by either stamp, pen and ink, or typewriter, provided all such written matter is distinctly legible and on the principal label, as prescribed in Regulation 17.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., March 13, 1907.

(F. I. D. 58.)

THE LABELING OF PRODUCTS USED AS FOODS AND DRUGS AS WELL AS FOR TECHNICAL AND OTHER PURPOSES.

Frequent requests for information relative to the proper labeling of products bearing the names of foods and drugs, but used also for technical and other purposes, are received. The following are typical:

"We will kindly ask you to advise us in regard to the new law that governs the line of oils. We manufacture a compound product, so-called 'turpentine,' which contains pure turpentine and a very fine petroleum product. It is used in most branches where pure turpentine is used, with the exception of medicinal purposes, for which we do not sell it.

"We understand that if we were to sell any cotton-seed oil so branded as to indicate that it was intended to be used as a food, for example, under the brand 'Blank Salad Oil,' it would be necessary to observe the requirements of the law referred to; but we are in doubt and would be glad to have your opinion as to whether a sale or shipment of this oil (for lubricating purposes) under the ordinary trade brand of cotton-seed oil, and without anything to indicate that it was of a quality suitable for use as a salad oil, would subject us to the provisions of this act."

During personal interviews the question of marking chemical reagents has also been discussed.

Products used in the arts and for technical purposes are not subject to the food and drugs act. It is, however, a well recognized fact that many articles are used indiscriminately for food, medicinal and technical purposes. It is well known that some products employed for technical purposes are adulterated or misbranded within the meaning of this act. Inasmuch as it is impossible to follow such products into consumption in order to determine to what use they are finally put, it is desirable that such an article sold under a name commonly applied to such article for food, drug, and technical purposes be so labeled as to avoid possible mistakes. The ordinary name of a pure and normal product, whether sold for food, drug, technical, or other purposes, is

all that is necessary. Pure cotton-seed oil or turpentine may be sold without any restrictions whatever, whether such article is sold for food, medicinal, or technical purposes, but it is suggested that a cotton-seed oil intended for lubricating purposes, or a so-called turpentine consisting of a mixture of turpentine and petroleum oils, used by the paint trade, be plainly marked so as to indicate that they are not to be employed for food or medicinal purposes. Such phrases as the following may be used: "Not for Food Purposes," "Not for Medicinal Use," or for "Technical Purposes Only," or "For Lubricating Purposes," etc.

In order to avoid complication it is suggested that chemical reagents sold as such be marked with such phrases as the following: "For Analytical Purposes," or "Chemical Reagent," etc.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., March 13, 1907.

(F. I. D. 59.)
NATIONAL FORMULARY APPENDIX.

The Nationl Formulary is one of the standards recognized under the law. The question has been asked a number of times whether the appendix of this authority would be construed as a part and parcel of the book itself. On page IV of the preface it is distinctly stated that the formulae collected in the appendix of the National Formulary are "no longer designated as 'N. F.' preparations." This shows that these formulæ are not integral parts of the book under the law, which covers only those products of the National Formulary recognized as such by this authority. By this it is understood that if a drug product is sold under a name contained in the appendix of the National Formulary, it would not be necessary for such product either to conform to the standard indicated by the formula or to declare upon the label its own standard strength, quality, and purity if a different formula is employed in its manufacture. Such articles are, however, subject to the law in every other respect, as is the case of other medicinal products not recognized by the U. S. Pharmacopœia or National Formulary.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., March 13, 1907.

(F. I. D. 63.)

USE OF THE WORD "COMPOUND" IN NAMES OF DRUG PRODUCTS.

Many inquiries are received concerning the use of the word "compound" in names of drugs products. There seems to be a general impression that this word can be applied as a corrective to many misbranded products. The following extracts serve as examples:

"You have on file our formula (active agents—croton oil and cascara), and we would ask if it is possible to call the same 'castor pill compound' and comply with the regulations?

"This liniment has been in use for forty years. The ingredients, each separately and collectively, are sanitary and highly curative. The one ingredient after which it was named happens to be present in the least proportion. Cannot the compound be called 'Compound Sassafras Cream?"

An eminent jurist writes:

"I should be glad to know the views entertained by your Department as to when a druggist has satisfied this act by a label or printed matter which he puts on the package or bottle in relation to compound. Take for example, the product now put on the market as Cascarin Compound, or Aloin Compound. I am impressed with the fact that such label must have added a statement as to what the other ingredients of the compound are. This may not mean, and probably does not mean, that the formula must be given or the exact proportions, but a purchaser has the right to know what is in the compound in order to determine for himself or to receive proper advice, as to whether it is safe to be used."

In no case can a preparation be named after an ingredient or drug which is not present. The word "compound" shall not be used in connection with a name which in itself, or together with representations and designs accompanying same, would be construed as a form of misbranding under the act.

It is held that if a mixture of drugs is named after one or more but not all of the active medicinal constituents (not vehicle) present in the preparation, the word "compound" can be used in connection with the name, (a) provided the

active constituent after which the product is named is present in an amount at least equal to that of any other medicinal agent present. Example: If it is desired to make a mixture of oil of sandalwood, balsam copaiba, and castor oil, and call this product "Oil of Sandalwood Compound," the oil of sandalwood should constitute at least 33⅓ per cent. of the entire mixture. Or (b) provided the potent active constituent after which the product is named is present in sufficient amount to impart the preponderating medicinal effect. Example: If a product is named after the active constituent, strychnine, the strychnine or one of its salts should be present in sufficient amount to produce the preponderating medicinal effect. Or (c) provided the complete quantitative formula, as outlined in the United States Pharmacopœia and National Formulary, be given on the principal label. A declaration of the complete quantitative formula, however, does not exempt the manufacturer or dealer from giving the information required by the act in the manner prescribed by the regulations. The ounce shall be the unit. The amounts of the ingredients present (excepting alcohol, which is to be stated in per cent.) shall be given in grains or minims, and if it is desired the metric equivalent may be given in addition.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., March 23, 1907.

(F. I. D. 68.)

LABELING OF FOOD AND DRUG PRODUCTS "MANUFACTURED FOR," "PREPARED FOR," "DISTRIBUTED BY," ETC.

Numerous inquiries are received relative to the marking of products not manufactured by the party in whose name they are sold. The following are representative:

"We prepare products on the special prescription of the customer, shipping the same to him in barrels to be rebottled, labeled, and packed for the market. Many of our customers are asking how the law effects this business.

"Manufacturing chemists ship goods to us made according to our formula; we bottle and label the goods. Should our name appear on the labels as manufacturers or distri-

buters? All of our remedies are given a distinctive name.

"If we put up a cough remedy for John Smith & Co., would it be sufficient to label it 'Sold by,' or must it be labeled 'Prepared for John Smith & Co.'?

"Will it be necessary to have appear on the label our name as the actual manufacturer of the product or will it only be necessary that the words 'Prepared only by' be cut out of the label and instead the words 'Prepared for' be printed thereon, just before the name of the Blank Chemical Company? You will, we think, appreciate that, as the preparation is made over their private formula and for their account, we acting merely as the agent for this manufacturer, we should not care to have our name attached to it or to any other preparation of this kind put up by another concern and should be obliged to discontinue the business entirely should it be required that our name appear on the labels for this preparation.

"I would respectfully call your attention to the injustice the enforcement of Regulation 18 (a) of Circular 21 will be to manufacturers of plain unmixed food products like sweet corn or tomatoes. This regulation enables jobbers to demand that their names be placed on the labels to the exclusion of that of the manufacturer and to enforce their demand. The remedy is a simple one and seems to be wholly within the intent of the law, viz., require that the name of the manufacturer and place of manufacture be put upon every package offered for sale, and that it be held misbranded if this is not the conspicuous feature of all labels on all packages of food, whether plain, mixed, or compounded."

In considering the above inquiries it should be borne in mind that the law forbids all forms of misrepresentation. Food mixtures and compounds having "distinctive names" must in all cases bear the name of the place of manufacture. No drug products, whether simple, mixed, or compounded, with or without "distinctive names," are required to bear the name of the manufacturer or producer, or the place where manufactured or produced, except when sold under proper name brands, i. e., brands in which both the given name and surname are used. All food and drug products sold under proper name brands should bear the name of the manufac-

turer or producer and the place of manufacture or production. In all cases where the name of party or place is stated upon the label such name must be the true name of the actual manufacturer, producer, or packer and the true name of the place where the article was manufactured, produced, or packed.

If, for trade reasons, when not required by law, a name or place be given upon the label of foods or drugs manufactured or packed for any person, firm or corporation by another person, firm, or corporation, one of two forms of labels is allowed, viz:

(a) The name of the actual manufacturer or packer and the place where the goods were actually manufactured or packed may be given, or

(b) The name of the person, firm, or corporation for whom the goods are manufactured or packed or by whom they are distributed may be given, if preceded by the words "Prepared for," "Manufactured for," "Distributed by," etc. The phrase "Sold by" is not satisfactory. The approved phrase should be set in type not smaller than eight-point (brevier) caps.

This rule holds even if the formula or prescription be furnished or owned by the parties for whom the goods are manufactured or packed.

Foods and drugs repackaged within a State and sold only within that State are not subject to the Federal law; but repackaged foods and drugs which enter interstate commerce or which are sold in the District of Columbia or in the Territories are subject to the law and should be labeled in accordance with this decision.

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., April 18, 1907.

(F. I. D. 70.)

ABUSE OF GUARANTY FOR ADVERTISING PURPOSES.

The attention of the Department has been called repeatedly of late to the abuse, for advertising purposes, of the serial number assigned to a guaranty. The Department of Agriculture accepts no responsibility for the guaranty which the manufacturer or dealer files. Particular attention must

be paid to the fact that it must neither be directly stated nor implied in any fashion that the Department of Agriculture or the United States Government guarantees or indorses the products to which the guaranty or serial number are attached. *The guaranty represented by the serial number is the guaranty of the manufacturer and not of the Government.*

To facilitate business a serial number is assigned to this guaranty, and the guaranty is filed in the Department of Agriculture for the purpose of verifying the serial number when it is used on packages of goods.

The misuse of the serial number is a misrepresentation, and in each case of such an abuse the serial number will be withdrawn and the guaranty returned after proper notice. Serial numbers, however, which have been issued and passed into commerce prior to withdrawal will be respected by the Department in any action which may be brought against dealers selling goods bearing the number which is improperly used.

The attachment of the serial number or guaranty to articles which are not foods or drugs is also regarded as a misrepresentation on which a similar action will be based.

H. W. WILEY,
FREDERICK L. DUNLAP,
GEO. P. MCCABE,
Board of Food and Drug Inspection.

Approved:
JAMES WILSON,
Secretary of Agriculture.
WASHINGTON, D. C., May 14, 1907.

(F. I. D. 72.)

USE OF GUARANTIES AND SERIAL NUMBERS THEREOF.

A misaprehension exists as to the requirements of the regulations for the enforcement of the food and drugs act, June 30, 1906, in regard to placing the serial number on articles manufactured by persons who have filed a guaranty with the Department and to whom a serial number has been issued identifying the said guaranty. Many have the impression that if a guaranty be filed the serial number which

is assigned to them must be used on all foods or drugs manufactured by them.

Regulation 9 provides two general methods of guaranty. The first is described in subdivision (b) of Regulation 9, as follows:

(b) A general guaranty may be filed with the Secretary of Agriculture by the manufacturer or dealer and be given a serial number, which number shall appear on each and every package of goods sold under such guaranty with the words, "Guaranteed under the foods and drugs act, June 30, 1906."

The second is described in subdivision (d) of Regulation 9, as follows:

(d) If the guaranty be not filed with the Secretary of Agriculture as above, it should identify and be attached to the bill of sale, invoice, bill of lading, or other schedule giving the names and quantities of the articles sold.

The statement in subdivision (b) that when a guarantor is assigned a serial number, the said number *shall appear* should not be construed as mandatory. The meaning is that if a manufacturer wishes to make effective the guaranty filed with the Department, he must place the legend and serial number on his goods, otherwise no protection is afforded to his customers in the absence of a special agreement or the alternative as provided in subdivision (d) of Regulation 9.

Regulation 9, in its entirety, is intended to provide for the enforcement and administration of section 9 of the food and drugs act, which reads as follows:

SEC. 9. That no dealer shall be prosecuted under the provisions of this Act when he can establish a guaranty signed by the wholesaler, jobber, manufacturer, or other party residing in the United States, from whom he purchases such articles, to the effect that the same is not adulterated or misbranded within the meaning of this Act, designating it. Said guaranty, to afford protection, shall contain the name and address of the party or parties making the sale of such articles to such dealer, and in such case said party or parties shall be amenable to the prosecutions, fines, and other penalties which would attach, in due course, to the dealer under the provisions of this Act.

A study of the law in connection with the regulations makes it apparent that the intention is to provide a means whereby the manufacturer can assume responsibility under the law for the character of the goods manufactured by him, after they have passed out of his possession into the hands of the person who purchased them from him. In no case is a guaranty a good defense, unless it be from the person who sold the goods to the person offering the guaranty as a defense. In order to simplify the procedure, the Department volunteers to act as custodian of the guaranty, which is an offer on the part of the manufacturer to free dealers, reselling his goods, from responsibility, under the law, for possible misbranding or adulteration. In order that the guarantor may convey this intention on his part to the purchasers of his goods, a serial number is assigned to such guarantor, and by placing this number on his goods he fixes his responsibility. Whether he desires to enter into an agreement of this kind with the purchaser of his goods is wholly a matter within his discretion, and he can use the serial number or not for this purpose, as he may please. The use of the number will save the trouble of individual guarantees with each individual transaction or each individual customer. In other words the label itself will carry notice that the manufacturer holds himself responsible, under the law, to the persons who purchase goods directly from him, for any misbranding or adulteration.

H. W. WILEY,
FREDERICK L. DUNLAP,
GEO. P. MCCABE,
Board of Food and Drug Inspection

Approved:
JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., May 17, 1907.

FOOD INSPECTION DECISION 76.

DYES, CHEMICALS, AND PRESERVATIVES IN FOODS.

It is provided in regulation 15 of the rules and regulations for the enforcement of the food and drugs act, that the Secretary of Agriculture shall determine by chemical or other examination those substances which are permitted

or inhibited in food products; that he shall determine from time to time the principles which shall guide the use of colors, preservatives, and other substances added to foods; and that when these findings and determinations of the Secretary of Agriculture are approved by the Secretary of the Treasury and the Secretary of Commerce and Labor, the principles so established shall become a part of the rules and regulations for the enforcement of the food and drugs act.

The law provides that no food or food product intended for interstate commerce, nor any food or food product manufactured or sold in the District of Columbia or in any Territory of the United States, or for foreign commerce, except as thereinafter provided, shall contain substances which lessen the wholesomeness or which add any deleterious properties thereto. It has been determined that no drug, chemical, or harmful or delterious dye or preservative may be used. Common salt, sugar, wood smoke, potable distilled liquors, vinegar, and condiments may be used. Pending further investigation, the use of saltpeter is allowed.

Pending the investigation of the conditions attending processes of manufacture, and the effects upon health of the combinations mentioned in this paragraph, the Department of Agriculture will institute no prosecution in the case of the application of fumes of burning sulphur (sulphur dioxid), as usually employed in the manufacture of those foods and food products which contain acetaldehyde, sugars, etc., with which sulphurous acid may combine, if the total amount of sulphur dioxid in the finished product does not exceed 350 milligrams per liter in wines, or 350 milligrams per kilogram in other food products, of which not over 70 milligrams is in a free state.

No prosecutions shall be based on the manufacture, sale, or transportation of foods and food products manufactured or packed during the season of 1907 which contain sodium benzoate in quantities not exceeding one-tenth of 1 per cent., or benzoic acid equivalent thereto, provided sodium benzoate or benzoic acid has hitherto been generally used in such foods and food products.

The label of each package of sulphured foods, or of foods containing sodium benzoate or benzoic acid, shall bear

a statement that the food is preserved with sulphur dioxid, or with sodium benzoate, or benzoic acid, as the case may be, and the label must not bear a serial number assigned to any guaranty filed with the Department of Agriculture nor any statement that the article is guarantee to conform to the food and drugs act.

The use of any dye, harmless or otherwise, to color or stain a food in a manner whereby damage or inferiority is concealed is specifically prohibited by law. The use in food for any purpose of any mineral dye or any coal-tar dye, except those coal-tar dyes hereinafter listed, will be grounds for prosecution. Pending further investigations now under way and the announcement thereof, the coal-tar dyes hereinafter named, made specially for use in foods, and which bear a guaranty from the manufacturer that they are free from subsidiary products and represent the actual substance the name of which they bear, may be used in foods. In every case a certificate that the dye in question has been tested by competent experts and found to be free from harmful constituents must be filed with the Secretary of Agriculture and approved by him.

The following coal-tar dyes which may be used in this manner are given numbers, the numbers preceding the names referring to the number of the dye in question as listed in A. G. Green's edition of the Schultz-Julius Systematic Survey of the Organic Coloring Matters, published in 1904.

The list is as follows:

Red shades:

107. Amaranth.
56. Ponceau 3 R.
517. Erythrosin.

Orange shade:

85. Orange I.

Yellow shade:

4. Naphthol yellow S.

Green shade:

435. Light green S. F. yellowish.

Blue shade:

692. Indigo disulfoacid.

Each of these colors shall be free from any coloring matter other than the one specified and shall not contain any

contamination due to imperfect or incomplete manufacture.

The decision further states that these coal-tar dyes must be made specifically for use in foods and bear a guarantee from the manufacturer that they are free from subsidiary products and represent the actual compound whose name they bear.

The following statement is necessary in order to illustrate the principles guiding the Department of Agriculture in framing this portion of the decision:

An extended study of the large number of so-called coal-tar dyes which are now in use for the coloring of foods and foodstuffs has been necessary to arrive at a conclusion concerning the restriction, if any, which may be placed on their use, and the Department acknowledges the very efficient aid rendered during the course of this study by Dr. Bernhard C. Hesse, of New York City. Doctor Hesse has had an extended experience in this subject through his long association with the leading dyestuff manufacturers in Germany. Since severing his connection with them he has given his time largely to expert work along this line.

The literature on this subject is very unsatisfactory as to what coal-tar products are used, and is not to be depended upon, because of the equivocal nature of the terminology employed. It is impossible to reduce this terminology to an unequivocal and definite basis for the great majority of such coal-tar odors.

It was impracticable to go to all those in the United States who use coal-tar dyes in food products and obtain specimens of the coal-tar colors so used. This is true not only because of the large number of such users and their wide geographical distribution, but also because of the reluctance which would undoubtedly be encountered among many such users to disclose the nature of the products employed by them.

The sources of coal-tar materials are limited in number, however. By reference to the book entitled "A Systematic Survey of the Organic Coloring Matters," by Arthur G. Green, published in 1904, on pages 9 and 10 thereof, it will be seen that there are 37 different concerns in the world engaged in the manufacture of coal-tar materials.

Therefore a canvass of these sources for such coal-tar

coloring matters, as in their judgment, or their business practice, they regard as proper for use in food products, seemed the best mode of obtaining a knowledge of the field of the coal-tar colors here in question.

Communication was had, therefore, with 13 manufacturers of coal-tar colors in an endeavor to obtain from them a list of such coal-tar colors as, in their judgment or business practice, were deemed suitable for use in food products. When this co-operation was established, request was also made for information as to the composition of the coal-tar samples submitted, and in order to avoid confusion samples were to be identified by reference to the "Systematic Survey of the Organic Coloring Matters," by Green, in which each coal-tar color has its own number. This information is necessary to reduce the terminology to a common and unequivocal basis. The thirteen manufacturers, or their accredited agents, with whom communication was held probably represent from 85 to 90 per cent. of the total dyestuff output of the world.

In order to make a provision for the 24 makers on the list in the Green tables, and not included in the 13 makers consulted, a request for samples was made from two New York City houses, who themselves import coal-tar colors from sources other than the above, for use in food products. Their products must fairly represent any output not represented by the 13 makers above mentioned.

The question of the choice of dyes for the coloring of foodstuffs has been decided on the basis of those dyes which have been submitted by the manufacturers or their accredited agents, but it was impossible to consider any dyes when the manufacturer or the accredited selling agent were unwilling to state unequivocally what the dyes submitted were, so that they could be identified chemically.

When those interested in placing dyestuffs on the market for the coloring of food have shown unwillingness to give information of this kind as to what they sell, and by thus selling, recommend, the burden of proof as to the harmlessness of such dyes lies with them, and until such proofs are adduced, the use of such dyes should be inhibited.

With this knowledge of the specific nature of the dyes recommended, the Department has made a study of those

concerning which there has been the greatest unanimity of opinion among the manufacturers or their agents as to their fitness; and in the cases where such dyes have been studied as to their physiological action, and the reports have been favorable, they have been included in the tentative list proposed in the food inspection decision herewith.

This tentative list of dyes includes a wide range of colors sufficient for all legitimate purposes. Among them are none which are patented, so that their manufacture is open to all interested in the dye industry.

One point may be particularly emphasized regarding the use of these dyes, namely, the need for the manufacturer's guarantee of purity. It is the manufacturer above all who knows the exact nature of his dyestuffs, and if he is willing to sell his colors for use in foodstuffs he should be willing to guarantee that the dyes really are what they are represented to be, that they are not mixtures, and that they do not contain harmful impurities.

In order further to minimize the possibility of harmful impurities existing in these dyes, it has been thought necessary to require a further examination by competent experts, a certificate from whom is necessary, stating that the dyes in question are what they are represented to be.

SOURCES OF SUPPLY.

When buying Drugs and Chemicals it is advisable, whenever possible, to obtain them from your nearest wholesale druggist. Unless you purchase in sufficiently large quantities to get jobbing prices, you will be able to buy quite as cheap and save express charges. When buying in larger lots, or if you are unable to obtain what you want locally, you will find the following firms strictly reliable.

When writing for quotations, always use Printed Stationery and enclose stamp for reply. Remember that catalogues, etc., cost the manufacturers considerable money, and do not ask for them merely out of curiosity.

WHOLESALE DRUGS AND CHEMICALS.

Truax & Green Co., Chicago, Ill.
Eimer & Amend, Third Avenue and Eighteenth St., N. Y. City.

BOTTLES, GLASS JARS, ETC.

Whitall, Tatum Co., 46-48 Barclay Street, N. Y. City.
Swindell Bros., Bayard and Russell Streets, Baltimore, Md.
Chesapeake Glass Co., Baltimore, Md.
Kimble Glass Co., Chicago, Ill.

TIN BOXES.

American Stopper Co., 19 Verona Street, Brooklyn, N. Y.
Economy Can Co., Chicago, Ill.
American Can Co., New York City.
Buckeye Stamping Co., Columbus, Ohio.

WOOD BOXES.

Bogert & Hopper, 162 William Street, N. Y. City.
E. B. Estes & Son, New York City.

ALUMINUM BOXES.

New Jersey Aluminum Co., Newark, N. J.
Economy Can Co., Chicago, Ill.
Utica Aluminum Manufacturing Co., Utica, N. Y.

COLLAPSIBLE TUBES.

A. H. Wirz & Co., 913-919 Cherry Street, Philadelphia, Pa.
Economy Can Co., Chicago, Ill.
Standard Specialty and Tube Co., New Brighton, Pa.

RUBBER STAMPS AND PRINTING.

William Eskew, Portsmouth, Ohio.

ESSENTIAL OILS AND PERFUME MATERIALS.

Fritzsche Bros., 82-84 Beekman Street, N. Y. City.
Magnus, Mabee & Reynard, 257 Pearl Street, N. Y. City.
Edwin H. Burr, 18 Cedar Street, N. Y. City.

SOAPMAKERS' MACHINERY.

Brown & Patterson, 33 Marcy Ave., Brooklyn, N. Y.
Thomas F. Congdon & Co., 50 Church Street, N. Y. City.
H. W. Dopp Co., Buffalo, N. Y.

SOAPMAKERS' MATERIALS.

Welch, Holme & Clarke Co., 383 West St., N. Y. City.
Innis, Speiden & Co., 46 Cliff St., N. Y. City.
Philadelphia Quartz Co., 121 S. Third St., Philadelphia, Pa. (Silicate of Soda.)

SOAP DIES.

Meyer-Jensen & Co., 2 Reade St. N. Y. City.
Mooney & Bueter, Chicago, Ill

GENERAL LABORATORY MACHINERY.

F. J. Stokes Machine Co., Philadelphia, Pa.
The J. H. Day Co., Cincinnati, Ohio.

GRAPHITE.

The Joseph Dixon Crucible Co., Jersey City, N. J.

WHITE WAX.

E. A. Bromund, 97-99 Reade St., N. Y. City.

POLISHING MATERIALS OF ALL KINDS.

The Pettit Chemical Co., 241 Front St., N. Y. City.

ANILIN DYES AND COLORS.

Schoellkopf, Hartford & Hanna, Buffalo, N. Y.
A. Klipstein & Co., 122 Pearl St., N. Y. City.

LITHOGRAPH STOCK LABELS AND PAPER BOXES.

Pictorial Printing Co., Aurora, Ill.
New York Paper Box Co., 34 to 40 West St., N. Y. City.
The William Koehl Co., Jamestown, N. Y.

MAILING CASES.

The Improved Mailing Case Co., 158 W. Broadway, N. Y. City.
St. Louis Paper Box & Tube Co., 3115 N. Broadway, St. Louis, Mo.

TIN FOIL AND BOTTLE CAPS.

Johnston Tin Foil Metal Co., St. Louis, Mo.
Patent Metal Co., Philadelphia, Pa.

TALC.

W. B. Daniels, 252 Front St., N. Y. City.
Pettit Chemical Co., 241 Front St., N. Y. City.
P. R. Dreyer & Co., 16 Cedar St., N. Y. City.
W. H. Whittaker, 245 Front St., N. Y. City.

PRIVATE BRANDS OF SOAP.

The W. and W. Soap Co., Cincinnati, Ohio.

TABLE OF EQUIVALENTS OF APOTHECARIES' AND METRIC FLUID MEASURES.

Minims		C.c.	Minims		C.c.	Fl. ozs.		C.c.	Fl. ozs.		C.c.
1	=	0.06	25	=	1.54	1	=	29.57	21	=	621.00
2	=	0.12	30	=	1.90	2	=	59.20	22	=	650.00
3	=	0.18	35	=	2.16	3	=	89.00	23	=	680.00
4	=	0.24	40	=	2.50	4	=	118.40	24	=	710.00
5	=	0.30	45	=	2.80	5	=	148.00	25	=	740.00
6	=	0.36	50	=	3.08	6	=	178.00	26	=	769.00
7	=	0.42	55	=	3.40	7	=	207.00	27	=	798.50
8	=	0.50				8	=	236.00	28	=	828.00
9	=	0.55				9	=	266.00	29	=	858.00
10	=	0.60	Fl. drs.			10	=	295.70	30	=	887.25
11	=	0.68	1	=	3.75	11	=	325.25	31	=	917.00
12	=	0.74	1¼	=	4.65	12	=	355.00	32	=	946.00
13	=	0.80	1½	=	5.60	13	=	385.00	48	=	1419.00
14	=	0.85	1¾	=	6.51	14	=	414.00	56	=	1655.00
15	=	0.92	2	=	7.50	15	=	444.00	64	=	1892.00
16	=	1.00	3	=	11.25	16	=	473.11	72	=	2128.00
17	=	1.05	4	=	15.00	17	=	503.00	80	=	2365.00
18	=	1.12	5	=	18.50	18	=	532.00	96	=	2839.00
19	=	1.17	6	=	22.50	19	=	562.00	112	=	3312.00
20	=	1.25	7	=	26.00	20	=	591.50	128	=	3785.00

TABLE OF EQUIVALENTS OF METRIC FLUID AND APOTHECARIES' MEASURES.

C.c.		Fl. ozs.	C.c.		Fl. ozs.	C.c.		Fl. drs.	C.c.		Minims
1000	=	33.81	400	=	13.53	25	=	6.76	4	=	64.8
900	=	30.43	300	=	10.14	10	=	2.71	3	=	48.6
800	=	27.05	200	=	6.76	9	=	2.43	2	=	32.4
700	=	23.67	100	=	3.38	8	=	2.16	1	=	16.23
600	=	20.29	75	=	2.53	7	=	1.89	0.09	=	1.46
500	=	16.90	50	=	1.69	6	=	1.62	0.07	=	1.14
473	=	16.00	30	=	1.01	5	=	1.35	0.05	=	0.81

TABLE OF EQUIVALENTS OF APOTHECARIES' AND METRIC WEIGHTS.

Grs.		Gms.	Grs.		Gms.	Drs.		Gms.
1/8	=	0.00810	21	=	1.360	1	=	3.9
1/6	=	0.01080	22	=	1.425	2	=	7.8
1/5	=	0.01296	23	=	1.460	3	=	11.65
1/4	=	0.01620	24	=	1.55	4	=	15.50
1/3	=	0.02160	25	=	1.62	5	=	19.40
1/2	=	0.03240	26	=	1.70	6	=	23.30
3/4	=	0.04860	27	=	1.75	7	=	27.20
1	=	0.065	28	=	1.82			
2	=	0.130	29	=	1.87	Ounces		
3	=	0.195	30	=	1.95	1	=	31.10349
4	=	0.260	31	=	2.00	2	=	62.20
5	=	0.324	32	=	2.10	3	=	93.30
6	=	0.400	33	=	2.16	4	=	124.40
7	=	0.460	34	=	2.20	5	=	155.50
8	=	0.520	35	=	2.25	6	=	186.60
9	=	0.600	36	=	2.30	7	=	217.70
10	=	0.650	37	=	2.40	8	=	248.80
11	=	0.715	38	=	2.47	9	=	280.00
12	=	0.780	39	=	2.55	10	=	311.00
13	=	0.845	40	=	2.60	11	=	342.14
14	=	0.907	42	=	2.73	12	=	373.23
15	=	0.972	44	=	2.86	16	=	497.60
15.432	=	1.000	48	=	3.00	48	=	1492.80
16	=	1.040	50	=	3.25	100	=	3110.40
17	=	1.102	52	=	3.40			
18	=	1.160	56	=	3.65			
19	=	1.240	58	=	3.75			
20	=	1.300						

TABLE OF EQUIVALENTS OF METRIC AND APOTHECARIES' WEIGHTS.

Gms.		Grs.	Gms.		Grs.	Gms.		Grs.	Gms.		Grs.
0.0081	=	1/8	0.065	=	1.003	1	=	15.43	100	=	1543.23
0.0108	=	1/6	0.100	=	1.543	2	=	30.86	125	=	1929.04
0.0162	=	1/4	0.130	=	2.006	3	=	46.30	150	=	2314.85
0.0324	=	1/2	0.150	=	2.315	4	=	61.73	175	=	2700.65
0.0486	=	3/4	0.180	=	2.778	5	=	77.16	450	=	6944.55
0.0567	=	7/8	0.200	=	3.086	6	=	92.60	550	=	8487.78
			0.300	=	4.630	7	=	98.02	650	=	10031.01
			0.500	=	7.716	8	=	123.46	750	=	11574.26
			0.700	=	10.803	9	=	138.90	850	=	13117.49
			0.900	=	13.890	10	=	154.32	1000	=	15432.35

EQUIVALENTS OF THE METRIC WEIGHTS AND MEASURES IN AVOIRDUPOIS AND APOTHECARIES' WEIGHTS AND MEASURES.

			Eng. Cub. In.		Apoth. Meas.
Millilitre	(ml)	=	.061028	=	16.2318 minims
Centilitre	(cl)	=	.610280	=	2.7053 fl. drams
Decilitre	(dl)	=	6.102800	=	3.3816 fl. ounces
Litre	(l)	=	61.028000	=	2.1135 pints
Decalitre	(Dl)	=	610.280000	=	2.6419 gallons
Hectolitre	(Hl)	=	6102.800000		
Kilolitre	(Kl)	=	61028.000000		
Myrialitre	(Ml)	=	610280.000000		

MEASURES OF WEIGHT.

			Troy Grains		Lbs.	Ozs.	Drs.	Grs.
Milligram	(mg)	=	.0154					
Centigram	(cg)	=	.1543					
Decigram	(dg.)	=	1.5432					
Gram.	(gm)	=	15.4323	=	0	0	0	
Decagram	(Dg.)	=	154.3234	=	0	0	2	34.3
Hectogram	(Hg.)	=	1543.2348	=	0	3	1	43.2
Kilogram	(Kg.)	=	15432.3487	=	2	8	1	12.3
Myriagram	(Mg.)	=	154323.4874	=	26	9	4	3.4

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